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KENTUCKY

GEOLOGICAL SURVEY

UM

FOURTH SERIES
Volume Five—Part Two

J. B. HOEING, State Geologist

FRANKFORT, KY.
1919

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The State Journal Company
Printers and Binders
Frankfort, Ky.

Kentucky Geological Survey

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OF
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Philip Russell

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FOREWORD

This report covering the coals of Magoffin county and to some extent the structural features thereof, was compiled by the authors in the winter of 1916-17 from field work done in the summer of 1916. The manuscript has been in the hands of the printers for some time, but due to a number of complications has not heretofore appeared in print. Since the field work in this county was done subsequent investigations have developed a considerable amount of new material and some changes in the text are indicated. However, on account of the demand for the information contained in this report it has not been deemed advisable by the present Commissioner of Geology and Forestry to hold up publication any longer. All new material and corrections will be made the subject of a supplementary report to be issued this winter (1919-1920).

No responsibility for the material contained in this publication is assumed by the present Commissioner of Geology and Forestry.

J. E. BARTON,
Commissioner of Geology and Forestry.

August 9, 1919.

PREFACE

The field work for this report was done between the middle of August and the middle of December, 1916.

The writers worked separately, that portion of the work done by each being as follows:

Browning: Mine fork below Wheelersburg, Rockhouse creek and other branches of Licking river to Lick creek, all creeks on the right of Licking river up to and including Oakley creek, and all creeks and branches on the left between and including Puncheon and Grassy creeks.

Russell: Mine fork above Wheelersburg, all branches of Licking river on the left from and including Lick creek to Puncheon creek, and those on the right above Oakley creek.

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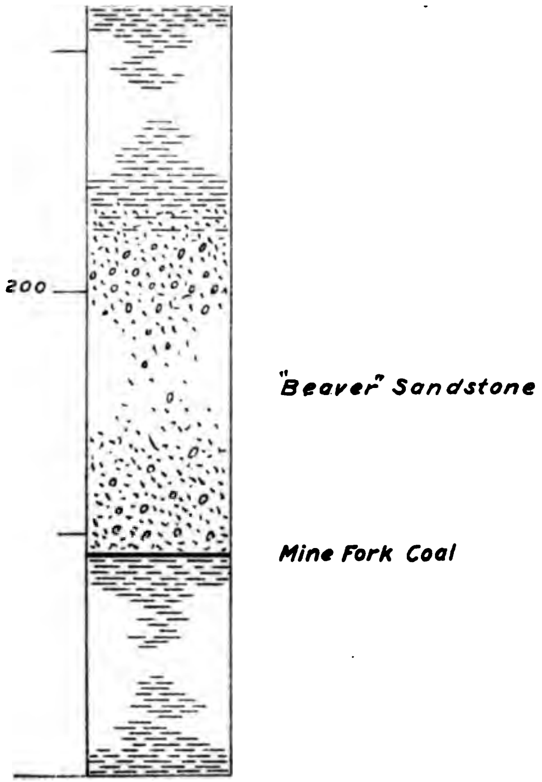
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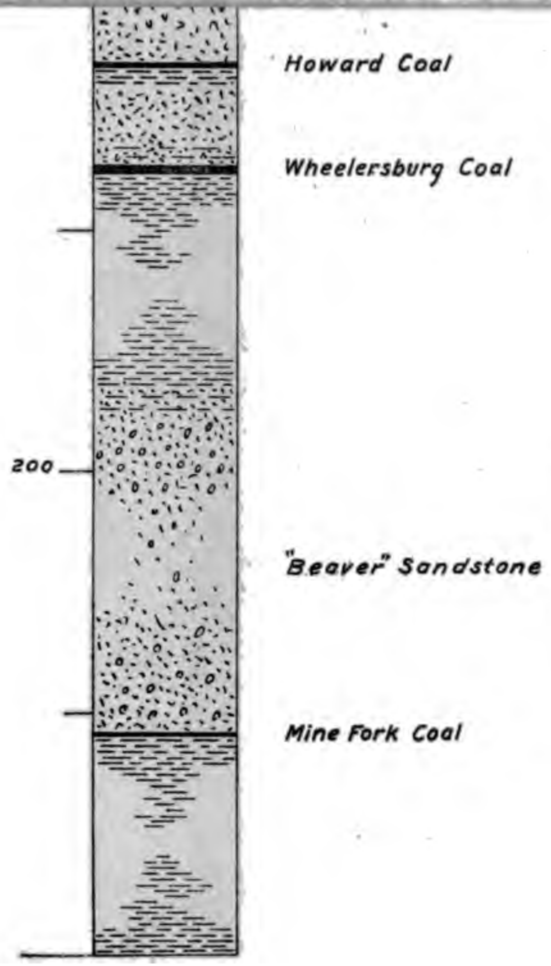
Mine Fork Coal


Howard Coal
Wheelersburg Coal
200
"Beaver" Sandstone
Mine Fork Coal

INTRODUCTION

LOCATION AND EXTENT

Magoffin county lies in the eastern portion of the State, and in the north-central portion of the Eastern Kentucky coal field. It comprises an area of 304.7 square miles, bounded on the north by Morgan county, west by Morgan and Wolfe counties, southwest by Breathitt county, south by Knott county, and east by Floyd and Johnson counties.

HISTORY

Magoffin county was created and established on the 25th day of April, 1860, from parts of Morgan, Johnson and Floyd counties. The act creating the county is given in Chapter 437, Acts of 1860.

PREVIOUS REPORTS

The first geological work done in Magoffin county of which there is any record is found in Volume IV of the Old Series of the Kentucky Geological Survey, pages 537 to 543. This work was done in the year 1858, by S. S. Lyon, along a base line surveyed across the State from the Ohio river in Union county, to the Virginia line. This base line enters Magoffin county at the head of State Road fork of Johnson creek and extends due east across the county, leaving it near the narrows of Jenny's creek. Mr. Lyon gave stratigraphic sections at various points on this line.

The next report dealing with Magoffin county is a Preliminary Report on the Geology of Morgan, Johnson, Magoffin and Floyd Counties, by A. R. Crandall, published by the Geological Survey of Kentucky as Part V, Volume VI, Second Series. In this report no attempt to correlate the few coals seen by the writer is made. Bed sections and a few stratigraphic sections only are given.

Bulletin 10 of the Kentucky Geological Survey, by A. R. Crandall, published in 1910, deals more extensively

Geo—1

with the coals of Magoffin county. Bed sections of a number of coals in the county and an occasional stratigraphic section are given.

The latest report on Magoffin county is found in Series IV, Vol. I, Part II, of the Kentucky Geological Survey, by James M. Hodge. This report covers only the upper part of Licking river from Oakley creek to its head.

TOPOGRAPHY

DRAINAGE

The drainage of Magoffin county is of the dendritic type and owes its character to the structure of the region and also to the stage in which the cycle of erosion of the drainage of the county is now found.

The stream courses are incised in nearly horizontal sedimentary rocks, which accounts for the dendritic type of drainage pattern, and partake of the characteristics of both mature and youthful drainage.

The complex drainage system, the well drained character of the region, and the pronounced meandering of the main streams are features of drainage in a region which is physiographically mature. The rapid fall of the streams—especially of the tributaries—the fact that the streams are everywhere down-cutting and practically nowhere depositing material, the excellent examples of recent stream piracy, entrenched meanders, and steep hillsides rising directly from the level of the main stream to considerable elevations, all point to recent drainage rejuvenation.

The drainage of Magoffin county is accomplished by two main streams. These are Licking and Big Sandy rivers, both tributaries of Ohio river. Licking river drains directly or indirectly approximately eleven-twelfths of the county, and Big Sandy one-twelfth in an indirect way through Paint and Middle creeks. The principal tributaries of Licking river are Rockhouse creek, Lick creek, Johnson creek, Middle fork, State Road fork, Burning fork, Puncheon creek and Trace fork. The fall of Licking river is not uniform. From the mouth of Rockhouse creek to that of Johnson creek, a distance of approximately 11½ miles, the fall is 30 feet, a fall of 2.6 feet to the mile. From Johnson creek to Middle fork, a distance of 5.6 miles, its fall is 14 feet, or 2.5 feet to the mile. From Middle fork to State Road fork at Salyersville, the fall is 4 feet to the mile. From Salyersville to the mouth of Gun creek the fall is 3.3 feet to the mile. From Gun creek to Puncheon creek it is

6 feet to the mile, and from Puncheon to the mouth of Straight fork, 4.8 feet to the mile.

The fall of Lick creek between the mouth of Raccoon creek and its mouth is 7.4 feet to the mile, and between Raccoon and Buffalo creeks it is 5.5 feet to the mile. The difference in elevation of the forks of Middle fork and its mouth is 16 feet, giving a fall of 6.4 feet to the mile. The fall of Burning fork from the mouth of Rocklick fork to its mouth is 52 feet, giving a fall of 14 feet to the mile. The rate is less on the lower half of the distance and greater on the upper half.

On the tributaries of Big Sandy the average fall of the streams is much greater than those of Licking river due to the lower elevation of Big Sandy river. This greater rate of fall, and hence a greater cutting power, has brought about two marked examples of stream piracy,. Burning fork of Licking river being the loser in both cases. The present State Road fork of Middle creek was once a part of Burning fork. However, the right fork of Middle creek, which is cutting its bed deeper much faster than Burning fork, cut away the divide between it and a small branch of Burning fork and robbed the latter of a large portion of its headwaters. This caused the extremely low gap just west of Ivyton, east of which the waters go into the Big Sandy, and also the wide bottom lands along Burning fork which are not consistent with its present volume of water.

The other example is in the case of Pond branch of the Narrows fork of Jenny creek. This branch was once a part of Burning fork, but the Narrows fork cut the divide away at the head of what was then a branch of Burning fork, and the waters of this branch and Pond branch now flow into the Big Sandy. This explains the low gap between Ivyton and the "Narrows", and also the "Narrows", the increased volume of water having cut the valley of the stream down much faster than it was broadened.

The courses of the main streams in Magoffin county are essentially as they were before the dissection of the once nearly level plateau began. This is inferred from the lack of any abandoned stream channels or alluvial deposits. The drainage, however, is to a slight degree consequent to the structure and character of the rocks through which they have cut their channels. This is strikingly brought out along the Licking river just below the mouth of Pricey creek, where the Caney anticline crosses. Here a massive sandstone is brought to an elevation now 90 feet above the river. This sandstone held the river above this point at the same level for a sufficient time to enable it to widen its valley in the softer shales coming above the sandstone and consequently an abandoned flood plain of the river is found at the elevation of the top of this sandstone as far up as Johnson creek. Here the Johnson creek fault causes another sandstone to be brought up and the same phenomenon is repeated. By standing on the ridge at the mouth of Stinson creek, an excellent view is had of this old flood plain as far as Salyersville. Another instance of the character of the rocks influencing the course of the stream is found at the big horseshoe bend in the river four miles above Salyersville. Here the soft, bluish-gray shales exposed around Salyersville and up the river to the mouth of Stinson creek give way to massive sandstone, and then back to shale above the bend. When the river encountered this sandstone it was deflected until it finally crossed the sandstone and continued in its course. Other examples of this kind are the big bend in the river at the mouth of Lick creek and also on Johnson creek where the fault crosses it.

The streams of Magoffin county—except during rainy periods—are fed very largely by numerous springs which issue from the coal beds. These springs are due to the percolation of waters through the usually more or less sandy, porous rocks which overlie the coals and the stoppage of these descending waters at the impervious shale or fire clay which, in the great majority of cases, constitutes the floor of the coal bed.

Since the county is well drained and in a nonglaciated territory, there are no ponds, lakes or waterfalls of any extent. Because of good drainage and the rapid fall of the streams there are no swamps.

RELIEF

The topography of the county is the type characteristic of the mountains of Eastern Kentucky. It is essentially a dissected plateau, in the mature stage of the cycle of erosion resulting from the long continued erosion and dissection of what was once a nearly level plain. In this type of topography, each small stream has cut back until only a ridge is left between it and the next branch. Since the rocks above drainage are almost exclusively sandstone and shales, mechanical agencies have greatly predominated over chemical and hence the ridges between the streams are sharp and uneven and the valleys deep and narrow. A cross section would show the ridges as Λ 's and the valleys as V 's. However, on the lower part of the main creeks and along Licking river the streams have nearly reached grades and are not degrading their valleys so rapidly, consequently they have broadened them in many cases to the extent of several hundred yards of level bottom land. This is most pronounced where the strata at and just above stream level consist of soft shales or shaly sandstones.

The lowest point above sea level in the county is on Mine fork at the mouth of Lacey creek. This elevation is 740 A. T.-38 feet lower than Licking river where it leaves the county. The rate of fall of the streams is not uniform. Where a stream cuts through a massive sandstone the fall is much greater than where it cuts through shales, and the sandstone forms, in some cases, high cliffs on both sides of the stream. This is especially true on the lower part of Mine fork, where the stream cuts through a conglomeratic sandstone.

The highest points are found toward the head of Licking river in the dividing ridges and these are all at nearly the same level. From Puncheon creek to the head of Licking river and toward the head of Half Mountain creek, Oakley creek, Stinson creek, Middle fork, Johnson and Whiteoak creeks, the tops of the ridges reach an average elevation of 1,450 feet with 1,600 feet as a maximum in the ridge at the head of the river. Over the remaining part of the county, however, the average elevation of the higher hill tops is about 200 feet less, with the exception of a few high points which reach an elevation 1,500 feet A. T.

The character of the rocks not only affects the height of the ridges but also their shape. Where the strata above the Young coal form a large part, the ridges are all more nearly the same height, with steep slopes and few good benches, while the measures below the Young coal form ridges with small knobs of unequal height, and with numerous benches on their slopes.

The topography of Magoffin county has an important bearing on the coal resources of the county.

The comparatively broad valleys and generally low hills of much of the county give the coals above drainage less area than do the deep, narrow valleys of the region drained by the Big Sandy river, where the hillslopes in general are considerably steeper and the hills rise higher above drainage.

Except where brought up by folds and faults, as in the north and northeast part of the county, the lowest coals are not exposed and there is a relatively smaller number of coals exposed on the hillsides than is the case in many other parts of the Eastern coal field of Kentucky. To determine the value of the lower coals in much of the county, therefore, resort must be had to core-drilling. The areas underlain by these lower coals, of course, will be largely increased by not being eroded.

The hillslopes of Magoffin county are in all cases far from uniform, consisting of a succession of steep and gentle slopes or, in places, nearly horizontal benches. The benches are due to strata of differing resistance to erosion. The bench is either developed on a resistant sandstone stratum overlain by a softer, less resistant formation which has been eroded—the surface of the bench being approximately the upper surface of the sandstone—or it is due to a thick non-resistant formation, such as a shale, overlain by a massive resistant sandstone, the gentle slope on the bench here being developed in the soft formation and the overlying resistant formation forming a steep slope above the gentle one. A bench therefore marks a change in character of sedimentation usually from quiescent shale conditions to conditions favorable to coal formations or to conditions resulting in the deposition of massive sandstone.

At different points on the same creek coal may be found (1) with a very slight bench or no bench at all; (2) not on the nearest bench but a short distance below the lower break of the bench; or (3) coming well up on the bench at its upper break. In (1) the coal bed lies between two massive sandstone beds with little or no shale interval. In (2) the coal bed has a massive sandstone roof with shaly strata above. The distance below the lower break of the bench is the thickness of the resistant sandstone roof of the coal bed. In (3) the coal bed has a shaly roof and a sandstone floor. This latter case is often illustrated by the Whitesburg coal.

Because of the great variability of the sediments, too much reliance cannot be placed on the position of coal beds with reference to benches in correlating the different beds. A bed on a prominent bench on one creek may, on another adjoining creek, have no bench at all, the resistant formation having changed to a non-resistant one.

CULTURE

Salyersville, the county seat, is a village with a population of 310, and is the largest in the county. It is located on Licking river at the mouth of State Road fork. Natural gas from two gas wells 3½ miles up Burning fork is used for lighting and heating purposes.

The only other village of more than 25 inhabitants is Ivyton, located near the eastern border of the county at the head of Burning fork.

The principal occupation of the inhabitants of the county is farming, although some lumbering is still carried on. A large part of the land has been cleared of the timber and the steep slopes cultivated for corn, which is practically the only crop grown. On the level bottom lands along the larger streams the land produces fairly well and some hay and sorghum is grown. Practically no fruit with the exception of apples is grown. These, however, grow in abundance without any cultivation whatever. At present no attention is given them because of no market, but with a railroad close enough to furnish a market, much could be accomplished in the way of apple growing in this county. The only exports are stock and lumber. The former are driven out to the Blue Grass towns and a large part of the latter is floated out of the smaller streams into the river and down this to Farmer, a small town where the C. & O. R. R. crosses Licking river, and sometimes as far down as Cincinnati. Some of it, however, is sawed into staves or cross-ties and hauled to the nearest railroad station.

No railroads enter Magoffin county. The Big Sandy and Kentucky River Railroad runs from Dawkins on the C. & O. R. R. two miles above Paintsville, up Jenny's creek to Riceville, which is 1½ miles from the eastern boundary of the county. On the west the Ohio and Kentucky Railroad, running from Jackson, Ky., to Licking river, four miles below West Liberty, comes within two miles of the county at Cannel City and Caney in Morgan county. The nearest railroad to the extreme southern part of the county is at Bosco, on Beaver creek, up which the C. & O. R. R. extends as far as Wayland.

The roads of the county follow the stream valleys, crossing the ridges at the heads of the streams wherever low gaps are found. Very little attention is given them and they are as a rule very poor, even in the summer. Good roads could be built in this county, however, and at not a great cost if the time and money were given to build and maintain them.

The chief means of communication is by telephone. No telegraph lines enter the county, the nearest one being at Paintsville in Johnson county. All parts of the county, however, are connected by private telephone companies with Salyersville, which has connection with Paintsville and other surrounding towns.

Licking river, the largest stream in the county, is not a navigable stream. In the winter during high water periods, timber in the form of loose logs and rafts is floated out to railroad points.

Most of the inhabitants live in the stream valleys. This is because the roads run in them and they are the only places where any level land is to be found. Travel through the county is slow and is done mostly on horseback, and entirely so during the winter months when the roads are in an extremely bad condition.

The high elevation of the county above the adjoining counties on the east and south has been the chief factor in preventing the construction of a railroad up to the present time. The development of the coal beds has been done almost entirely by the natives, and this only for their local use. Entries are rarely driven back any distance, but are abandoned when a few yards in and a new one started. Wherever possible coal is dug from the bed of the branch rather than from entries into a coal on the hillside.

DESCRIPTIVE GEOLOGY

STRATIGRAPHY

The rocks exposed at the surface in Magoffin county are all of marine sedimentary origin, the material of which they are made having been deposited in or by water. They consist of sandstone, shales, coal beds and a few thin limestones.

With the exception of the valley alluvium, all the rocks above the surface and for some distance below the surface belong to the Pennsylvanian Series of the Carboniferous System, nearly all of these being within the Pottsville, the lowest division of the Pennsylvanian, and only those capping the tops of the highest ridges belonging in the Allegheny—the next higher division of the Pennsylvanian.

The character of the rocks below the base of the Pennsylvanian can best be shown by the log of a well drilled near Hendricks Postoffice and given below

WELL NEAR HENDRICKS POSTOFFICE

	Thickness	*Depth*	
Drift	40	40	Pennsylvanian
Black slate	260	300	
Gray sand	85	385	
Black slate	75	460	
Shelly slate	25	485	
White sand	230	715	
Gray lime	210	925	Mississippian
Dark slate	245	1,170	
Shelly sand	20	1,190	
Bastard, gray sand	100	1,290	
Shelly slate	100	1,390	
Black slate	400	1,790	Devonian
Lime	290	2,080	Devonian, Silurian and Ordovician
Bastard, gray sand	50	2,130	
Slate and red shale	77	2,207	

A generalized section of the rocks above the surface, beginning with the highest, is given below.

GENERAL SECTION

Thick-bedded to massive, medium coarse-grained, light brown sandstone	75'+	
Covered	44'	
Coal(?)		
Shaly sandstone	20'	
Coal		
Shale	10'	
Cannel coal	2'±	
Light gray shelly sandstone	20'	
Hindman coal	4'±	
Puncheon Creek sandstone, upper 60 feet massive, coarse-grained, white to brownish white; forms great cliffs. Lower 35 feet, fine-grained, massive; does not usually form cliffs	70'	—120'
Fugate coal	0	— 55"
High Rock sandstone, massive, coarse-grained, white to brownish white; forms cliffs 25 to 40 feet high, but not always cliff-forming	30'	— 50'
Flag coal rider	12"	— 28"
Bluish gray shale, changing to shaly sandstone	10'	— 30'
Flag coal	2'	— 4'
Sandstone, medium-grained, light brown, usually massive, but sometimes shaly	30'	— 70'
Hazard coal	1½'	— 6'
Sandstone, usually massive, sometimes shaly	16'	— 45'
Whittaker coal	0"	—109"
Sandstone, usually massive, medium-grained, light brown; sometimes shaly or changing to shale	25'	— 50'
Young coal, may be one seam or split into a number of thin seams	0"	— 68"
Sandstone, medium-grained, light brown and massive; sometimes replaced by shales	40'	— 60'
Trace Fork coal, unimportant	0"	— 28"
Sandstone, shaly, light brown	5'	— 15'
Shale, dark bluish gray; may be replaced by sandstone	5'	— 10'
Fossil limestone, generally in two beds, separated by dark blue shale	1'	— 2'
Shale, soft, bluish gray	8'	
Sandstone, shaly and with ripple mark	5'	— 25'
Haddix coal	0"	— 62"
Sandstone, massive at base but shaly in upper part	10'	— 35'
Hamlin coal, unimportant	0"	— 33"
Sandstone, usually massive, with calcareous cement; sometimes shaly	10'	— 45'
Fire clay rider coal, unimportant	0"	— 22"
Shale, light gray, sometimes sandy. May contain concretions	10'	— 25'
Fire clay coal	0"	— 48"
Sandstone may be replaced by shale; large calcareous concretions	35'	— 60'
Whitesburg coal	0"	— 65"
Shale, light gray, fissile; contains large calcareous concretions and septaria; may be replaced by sandstone	45'	— 65'

Gun Creek coal	0	— 39″
Shale, light gray, carries small calcareous concretions	42′	— 67′
Tom Cooper coal	0	— 48″
Sandstone, massive, fine-grained, white; sometimes replaced by gray shale	35′	— 55′
Lacey Creek coal	0	— 32″
Sandstone, medium fine-grained, massive; sometimes shaly	30′	— 50′
Howard coal	0	— 24″
Sandstone, massive, fine-grained, brownish white to white; sometimes replaced by shale	35′	— 50′
Wheelersburg coal	9″	— 28″
Shale, soft, gray; sometimes contains concretions	60′	— 90′
Sandstone, the "Beaver" sand of oil drillers; massive white, coarse-grained; contains small white quartz pebbles; cliff-forming	160′	
Mine Fork coal	14″	— 18″
Shale, bluish gray	90′	

Only three members in the foregoing section (disregarding coal beds) are persistent enough in character to be recognized as distinct formations. These are: the Puncheon Creek sandstone; the High Rock sandstone, and the Fossil limestone.

PUNCHEON CREEK SANDSTONE

This sandstone takes its names from Puncheon creek of Licking river, where it is well developed. It is a massive, soft, coarse-grained sandstone, grayish-white in color unless stained by iron oxide. This, however, is often the case near the weathered surface.

The Puncheon Creek sandstone is poorly cemented and more porous than the sandstones below the Flag coal. It is made up largely of quartz and feldspar with a little muscovite and iron oxide. The individual grains are larger and are not welded and dovetailed together as are the grains of most of the sandstones below the High Rock sandstone.

The feldspar grains, though largely turned to kaolin, still preserve their granular character and may be isolated. Such is rarely the case in the lower sandstones in which the feldspathic material is so disposed between the grains as not to come out in individual grains, but falls to a powder.

The surface of the Puncheon Creek sandstone which has been exposed to weathering is rough with the quartz and feldspar grains which stand out in relief on the surface, the cementing material between them having been removed by weathering. It is this rough surface of this formation which permits the roots of the fungus to obtain foothold and the fungus growth so characteristic of the Puncheon Creek and High Rock sandstones is attributable to the nature of the material which constitutes them.

Frequently the Puncheon Creek sandstone shows much limonitic material between the grains. The lower sandstones frequently contain small, black, carbonaceous specks, but no carbonaceous material has been noted in the Puncheon Creek sandstone.

Owing to its petrologic character and poor cement the Puncheon Creek sandstone weathers to a light yellowish to gray, mealy, sandy soil. This sandstone forms cliffs 50 to 70 feet in height when near the top of the ridge. The lower 30 to 50 feet is finer grained, sometimes shaly and generally comes in a covered interval.

The sandstones below the Puncheon Creek and High Rock sandstones weather in smooth, hard surfaces with a comparative lack of pits or irregularity of the surface in general.

The Puncheon Creek sandstone weathers in rounded surfaces which are rough and characteristically pitted and fretted with small ridges and hollows and are very irregular in outline.

From the head of Licking river to Puncheon creek, on the left, and Oakley creek, on the right, this sandstone is the upper of two prominent cliff-forming sandstones. Sometimes, however, the lower one, the High Rock, does not form cliffs and then only one cliff is seen—the Puncheon Creek sandstone.

On Bear branch of Middle fork these two sandstones are close together and on Middle fork, Johnson creek, Whiteoak creek, Lick creek and Rockhouse creek, they form a continuous sandstone. Throughout the area just given, however, the High Rock sandstone is generally lacking in its cliff making character and is therefore covered by debris from the higher sandstone.

HIGH ROCK SANDSTONE

This sandstone is a massive, soft, coarse-grained sandstone of a grayish-white color. It is called the High Rock sandstone because it is found on several high points exposed in cliffs, called "High Rocks" by the natives. It is the sandstone described in previous reports of the Survey as a cliff-forming sandstone coming just above the Flag coal. On Puncheon creek, Half Mountain, Oakley creek, and Bear branch and Boardtree fork of Middle fork, where it is best developed, it forms a cliff 30 to 40 feet in thickness.

The petrologic character of the sandstone, where it forms cliffs, is the same as that of the Puncheon Creek sandstone and it is very easy to confuse the two. The High Rock sandstone, besides the places mentioned above, is also cliff-forming on Salt Lick branch, Long branch and Whitley creek. From Howard branch to Grassy creek it is non-cliff-forming and is seldom seen even as a ledge.

As stated in the description of the Puncheon Creek sandstone, the High Rock and Puncheon Creek sandstones form a continuous sandstone deposit over a large part of the county and the former often loses its cliff-making character.

FOSSIL LIMESTONE

The Fossil limestone is a thin bed of limestone of marine origin and containing marine fossils. Its thickness never exceeds three feet and its usual section is as follows:

1 to 2½ feet of dark blue, medium to fine-grained limestone containing many brachiopod shells.
1 to 15 feet of soft, dark blue shale sometimes containing stems and plates of crinoids.
4 to 8 inches dark gray medium to coarse-grained, impure limestone usually containing abundant fragments of crinoids; also brachiopod shells, and in a few cases, shells of molluscs.

The Fossil limestone is almost as valuable a horizon marker as the Fire Clay coal, as it is the only limestone of marine origin found in the county. It is more or less persistent over the whole county usually coming in a bed of soft, blue shales varying from 5 to 25 feet in thickness. It is best developed on the upper part of Licking river, and on Middle fork; in other places it is missing locally, being cut out by a massive sandstone. It can be used to good advantage as a key-rock in working out structure and in correlating the coals. However, when high in the hills it is rather difficult to locate, being thin and in shales which form a covered interval.

The strata between the Flag coal and the Fossil limestone are usually massive sandstones. They are finer grained than the High Rock and Puncheon Creek sandstones and are not cliff-forming. No distinguishing features other than their stratigraphic position mark these sandstones from one another.

That part of the stratigraphic section lying below the Fossil limestone differs from that above in that the sandstones are usually finer grained, better cemented and the shales are more abundant, especially the light gray, fissile shales which are often concretionary.

NATURE AND CHARACTER OF THE ROCKS EXPOSED

The rocks above drainage consist of a series of sandstones, shaly sandstones, sandy shales and argillaceous shales with two distinct limestone horizons and numerous coal beds.

The lowest rock exposed in Magoffin county is a pebbly sandstone which is probably the equivalent of the Nuttall sandstone of West Virginia. The pebbles in this sandstone attain a maximum diameter of ½ to ¾ inch, and are of white, milky quartz, and are usually well rounded.

Some of the soft semi fissile to fissile, calcareous shales are dark blue and bluish gray, but most of the shales are a light gray in color.

The thin fossiliferous limestone which lies over the Haddix coal is dark blue gray in color and the concretionary impure limestones are usually a lighter gray. In general, however, the rocks are strikingly light colored, appearing whiter at a distance when exposed in cliffs.

There is no individual formation exposed at the surface which exceeds 80 feet in thickness.

There is a very notable changeability of these formations. Abrupt transitions are common from a massive sandstone bed to an arenaceous shale within a distance of 100 yards. For this reason too much reliance cannot be placed on stratigraphy in the correlation of coals. The lack of persistent lithologic characteristics in formations at the same stratigraphic horizon is strikingly illustrated by the changes which are the rule rather than the exception in the roofs of coal beds. In no instance can any of the coal beds in the county be said to be characterized over the county as a whole by a massive sandstone roof, a shale roof or a bituminous shale roof.

In many cases this change is due to erosion of the material which was originally deposited over the bed and the deposition of different material. This is illustrated by the roof of the Whitesburg coal. This coal usually shows a black shale roof and, of all the coal beds, comes nearest to being everywhere distinguished by this roof. In places where a massive sandstone comes over the immediate black shale roof of this bed, as at the head of Burning fork about Ivyton, the thickness of this black shale varies greatly in short distances from 3 feet to total absence, this change being due to the erosion of the black shale which was originally deposited over this coal.

In general the sandstones which come over the Hazard coal are distinguished from those below and especially from the sandstones below the Fire Clay coal, in being coarser grained, poorer cemented, more ferruginous and with more frequent light yellowish or light brownish colors.

The lower sandstones and especially those sandstones below the Fire Clay coal are much finer grained, much lighter colored, commonly nearly, and often absolutely, white, and are more frequently calcareous than are the upper sandstones.

The dark gray to bluish gray, fine-grained, soft and frequently fissile and calcareous shales—as distinguished from the sandy shales which grade frequently by way of shaly sandstone into massive sandstone—are generally restricted to that portion of the formations exposed in the county, which lie below the Fossil limestone. Such shales are the shales below and just above the Fossil limestone—the concretionary shales often found well developed between the Gun Creek and Tom Cooper coals, but also equally so at other horizons, and the shales lying between the Wheelersburg coal and the top of the conglomeratic sandstone. Between these latter formations there are frequently found locally other shale beds.

Cross-bedding is abundant in the rocks, especially in the massive sandstones, shaly sandstones and sandy shales.

Ripple marks are seldom found and are apparently restricted to the shaly sandstones occurring shortly below the Gun Creek coal.

ALLEGHENY

This division of the Pennsylvanian derives its name from the Allegheny river in Pennsylvania where it is well exposed. Only about 100 feet of rocks of this formation are found in the county and these only on a few high knobs in the ridge at the head of Oakley and Half Mountain creeks. Nothing as to the character of these rocks is known as they were mostly covered where seen. A cannel coal bloom which comes in this formation was found at one point.

STRUCTURE

To show fully the structure in the county, contours are used. This method of presenting structure consists of contour lines drawn on the map which mark the intersection of horizontal planes at regular vertical intervals apart and the top or bottom of a certain stratum in the rock formation. The stratum used in preparing the structure map which accompanies this report was the flint clay parting of the Fire Clay coal.

Originally the strata composing the rock formations in the county were horizontal. Since their formation, crustal movements have thrown them out of their position, and they now dip in various directions. Displacements have also taken place as the result of faults. As a rule the angle of the dip of the strata is so small that it cannot be easily measured with a clinometer, but in a few instances dips of as much as 10½° were measured.

FAULTS

Two faults, the Caney fault and the Johnson Creek fault, are found in the northern half of the county.

CANEY FAULT

This fault is an ordinary normal fault with a throw of from 100 to 150 feet. It was in all probability produced by the tension in the strata caused by the pressure which formed the Caney anticline which parallels the fault, the axis being about 1½ miles from it. The downthrow is on the north side of the fault, which passes through the county in a nearly east and west direction. The dip of the fault plane was measured in only one place and was here 28°, the direction of the inclination being to the south. The break is clean and sharp, and there is practically no drag zone. The rocks on the downthrow side are usually slightly fractured for several feet back of the fault plane. This fault was first seen near Caney, Morgan county, Ky., passing about three miles north of that place and running in a southwest direction. Coming east from Caney, it crosses Whiteoak creek near the forks. East of that point it swings more to the east and enters Magoffin county near where the county line crosses Rockhouse creek. It crosses that creek a number of times between the mouth of Trace branch and the forks, and parallels the left fork, running almost due east and west to the head of it. From this point it takes a southeast course, crossing Lacey creek just above the mouth of Browns fork and Mine fork at the mouth of Lacey creek. Here it passes out of the county and was not traced further. This fault shows at many places on Rockhouse creek, Lacey creek and Mine fork. It shows plainly at the mouth of Trace branch, and in the branches on to the head of the creek. On Mine fork it is especially prominent, due to the heavy conglomeratic sandstone which stands out in cliffs and renders the offset easily seen. On the upthrow side the strata dip slightly away from the fault but on the downthrow side the dip is very strong toward it, reaching an angle of 10°. This dip is easily noticed in the benches and ledges of rock showing on the hillsides.

THE JOHNSON CREEK FAULT

This fault is also a normal fault with a maximum throw of 100 feet. It enters the county from the west, ¼ mile north of the State Road fork of Johnson creek and runs in a direction 10° north of east, about two-thirds the distance across the county, dying out in the ridge between Lick creek and State Road fork. It crosses Elk creek at the forks and extends on to the head of the right fork. It does not cross the State Road fork, but the effect of its dying out is probably shown in an area of disturbed strata one-third mile below Falcon on State Road fork. It is plainly visible on the right branches of State Road fork of Johnson creek, on Turkey and Long branches of Johnson creek and where it crosses that creek 1¼ miles from its mouth; also where it crosses Licking river and on Long branch, May branch and Elk Creek. The downthrown side of this fault is on the south and the upthrow on the north.

Near the fault there is a strong dip, reaching 8° on Elk creek. The movement involved was concentrated along this one break and not distributed among a number of parallel faults as is sometimes the case.

There is only a very slight drag zone on the downthrow side, which is only perceptible for a few feet south of the fault line.

The dip of the fault plane was measured at one point on Long branch where it was 20° to 25° in a direction S. 10° E. On Elk Creek the dip appeared to be greater than this. This fault is evidently an adjustment fault.

No sharp anticline is found to the south of this fault, the production of which could have resulted in tension which could have occasioned the fault, although such is apparently the cause of the Caney fault.

CANEY ANTICLINE

This is a distinct fold in the strata which extends across the northern part of the county. The crest or axis of it is about 1½ miles south of the Caney fault and runs parallel with it. The slope on the south side of the fold is longer and more gentle than that on the north side. The axis of this anticline passes about ½ mile north of Caney, Morgan county, from which place it gets its name, and from there runs in a northeast direction, crossing the two forks of Whiteoak Creek and entering the county near the mouth of Pricy creek. From this point it turns almost due east and follows the ridge between Raccoon and Rockhouse creeks to Mine fork where it unites with the Mine Fork dome.

MINE FORK DOME

This is a marked dome-like structure which was produced at the same time and as a part of the Paint creek uplift. The area involved by the dome is approximately 12 square miles. The apex of the dome is near the mouth of Tucklick branch of Mine fork, where the Wheelersburg coal is brought to an elevation of 1,270 feet A. T. To the north and northwest from this point the dip is fairly rapid. West the dip is more gentle as the crest of the Caney Anticline comes in from this direction. Southwest, south, and southeast the dip is greater than to the west, but it is not as regular and hence the structure is not as even on that side of the dome. The east side of the dome lies largely in Johnson county and the structure was not carefully worked out there.

The lowest strata in the county are brought above drainage by this dome. They consist of 250 feet of strata of the New River group of the Pottsville, including the Beaver sandstone (Nuttall) and about 90 feet of shales underlying it. The Mine Fork dome takes its name from Mine fork of Paint creek, since the greater part of it is included in the area drained by that creek.

BURNING FORK DOME

The strata involved in the formation of this dome are those underlying an area of approximately 17 square miles. The center, or rather the area in which the uplift was greatest, is about two square miles in extent, lying at the head of Burning fork of Licking river and the head of State Road fork of Middle creek. From this small area, the strata dip in all directions. To the north and east the dip is much greater than to the west and south. This gives the dome an irregular shape, which may be likened to the right valve of a clam shell, with the hinge line on the north. The dome takes its name from Burning fork of Licking river, which drains a large part of the area involved in the doming.

LICKING RIVER SYNCLINE

From the mouth of Gun creek the strata dip south at the rate of about 25 feet to the mile, to an east-west line crossing Licking river near the mouth of Trace fork. South of this line the dip is in the reverse direction and the strata rise at the rate of about 25 to 30 feet to the mile to the head of the river. This broad down-folding of the strata is designated the Licking river syncline in this report. The westward extension of this syncline passes out of the county near the head of Buck creek, as indicated by dip of strata to the south, near the heads of Half Mountain and Oakley creeks and Middle fork of Licking river.

GRAPE CREEK SYNCLINE

This is a pronounced structural basin lying between the Johnson Creek fault and the Caney anticline. The axis of this basin parallels and lies just on the right of Grape creek. It crosses Licking river between Grape creek and Harper branch and extends nearly to Lick creek. Northwest of this line the strata rise toward the Caney anticline and southeast of it they rise slightly toward the Johnson Creek fault. It is named the Grape Creek syncline from Grape creek which lies nearly in the center of the basin.

JOINTS

Although the strata of Magoffin county have been disturbed by a number of minor domes and folds and also some faults, there is a striking lack of jointing in the rocks of the county. With the exception of a small zone about the Johnson creek and Caney faults, pronounced jointing was only found in one place on the first left branch of the left fork of Trace fork, near the head of Licking river. Here finely developed joints in two systems show in the fossiliferous limestone and the surrounding calcareous shales. The shales show close set parallel joints having a direction S. 50° E. In this same locality the fossiliferous limestone shows in the bed of the stream separated into regular rectangular 2 x 4-foot blocks by solution along joint systems.

In connection with the above mentioned absence of joints should be mentioned the total absence of veins of any kind in the county as far as known. This absence of veins is with little doubt due to lack of joints or fissures. Material to fill fissures or joints, had they existed, was not lacking, as is shown by the numerous calcareous concretions at times carrying small amounts of sphalerite, galena and chalcopyrite.

ECONOMIC GEOLOGY

COAL

With the petroleum resources of Magoffin county undetermined, coal is the most important of the mineral resources of the county from an economic standpoint. Coal has been found at many stratigraphic horizons in Magoffin county. As previously stated, these coals are mainly in the upper part of the Pottsville in the Kanawha group. Certain of the coals above the Hindman coal, however, are Allegheny and one coal, the Mine Fork coal is older than Kanawha time. The relative positions of these coals are shown in the general section previously given. This section, however, does not show splits from some of the beds or a few local coals which are neither thick nor persistent. Intervals given in this section will vary considerably in different sections of the county.

CORRELATION OF THE COALS

The coals described in this report which come above the Gun Creek coal are correlated with coals found elsewhere in the Eastern Coal Fields and described in previous reports of the Survey. It is well to state, however, that these coals have not been actually traced through from other regions, but are correlated on the basis of the evidence given below in the next section.

The coals from the Gun Creek coal to the Wheelersburg coal are given local names and no attempt at correlation with other regions is made.

The Wheelersburg coal is no doubt the number one coal of the old Survey. The Gun Creek coal is possibly the Amburgy coal of the North fork of the Kentucky River, and the Tom Cooper or the Lacey Creek coal may represent the Elkhorn coal.

KEY-ROCKS

The horizon markers in Magoffin county are as follows: the Fire Clay coal; the Fossil limestone; the High Rock and Puncheon Creek sandstones and the top of the conglomeratic sandstone below the Wheelersburg coal. Both the correlation and identification of the coals of the county was effected by establishing the relation of the coals to one or more of the above mentioned horizon markers and once a coal was correlated and could be recognized, it in turn was used as a local horizon marker over the region to identify adjoining beds.

FIRE CLAY COAL

The Fire Clay coal, because of its peculiar and unmistakable flint fire clay parting, is the best key-rock for the county. In nearly all instances where the Fire Clay coal is present and above drainage this flint fire clay parting is present in some part of the bed. There is occasionally a thin flint fire clay parting also found in the Gun Creek coal, but it is never over ¼ inch thick. A hard parting somewhat resembling the flint clay parting is also sometimes found in the Hazard coal. At the head of Lick creek, Mine fork and State Road fork, however, this flint fire clay disappears and either the Fire Clay coal must be recognized by some other local peculiarity in this region or must be abandoned as a horizon marker.

THE FOSSIL LIMESTONE

The Fossil limestone is an exceedingly valuable horizon marker in Magoffin county and is second only in value as an index bed to the Fire Clay coal. The Fire Clay coal has more continuity, is lower stratigraphically and frequently exposed artificially. In a part of the county, as at the head of Licking river, where the Fire Clay coal is below drainage; and at the head of Lick creek and Mine fork where the flint fire clay parting of the Fire Clay coal is wanting, the Fossil limestone is the most reliable key-rock and it is partly on the basis of this bed that the correlation of the coals has been made in these regions.

Non-fossiliferous, bastard limestones are occasionally found at other horizons and on Mine Fork a limestone containing fossils occurs between the Lacey Creek and Wheelersburg coals.

HIGH ROCK SANDSTONE

The High Rock sandstone is a useful horizon marker and is especially valuable in the correlation of the Flag.

Flag Rider and Fugate coals. The identity of the High Rock sandstone, however, must be established with care on the basis of lithological character, interval to the Fire Clay coal, and topographic expression; and when the bed has been once established care must be taken not to confuse it with the higher Puncheon Creek sandstone. Frequently the High Rock sandstone becomes thin and fails to stand out in cliffs. Where this is the case, the Puncheon Creek sandstone is very likely to be erroneously identified as the High Rock sandstone.

SANDSTONE BELOW THE WHEELERSBURG COAL

This sandstone, or rather the top of this sandstone, is a valuable horizon marker and is useful in the correlation of the Wheelersburg coal which comes 70 to 100 feet above it. This sandstone is unmistakable, being a heavy sandstone formation with a well marked topographic expression, and is the only pebbly sandstone found in the lower part of the section. The top of the formation is usually well defined because of the soft shale which lies above it and under the Wheelersburg coal.

Elevations given in this report are mostly barometric and are taken standing on the floor of the coal bed or at a level with the floor of the bed unless otherwise stated. In that part of the county which is included in the Salyersville sheet the only established elevations were those given by a railroad survey on Licking river and were as follows: Mouth of Johnson creek, 806; mouth of Middle fork, 820; low water at Salyersville, 840; and these elevations were used as base bench marks. Between these known points interpolation was made to elevation of different intervening points on the river. Wherever possible the barometers were set from bench marks on the Goodloe and Prestonburg topographic sheets and traverses run over into adjoining parts of the county and tentative elevation marks established. It is thought that generally speaking the elevations are accurate within 10 feet; but in regions where there was a lack of known elevation marks, the elevations may be off as much as 20 feet or even more.

In describing the coals, the various beds are taken up separately and their extent, character and thickness described for the entire county and for each creek, or where small, a number of creeks. In describing openings and giving bed sections the different creeks are taken as units, the description starting at the mouth and going to the head.

MINE FORK COAL

This is a thin coal exposed above drainage only on Mine fork, and is, as far as known, the lowest coal in the county. It was only seen in three places and measured only 18 inches as a maximum in thickness. Being below drainage over the rest of the county, nothing more of its character is known. It comes just beneath the massive conglomeratic sandstone, and probably corresponds with one of the "Sub-conglomerate" coals described by Prof. Crandall.

WHEELERSBURG COAL

This is a coal coming 60 to 90 feet above the top of the conglomeratic sandstone, the interval to that sandstone consisting of light gray, soft shales. From its interval to the top of the sandstone, and the character of the rock forming this interval, the Wheelersburg coal is correlated with the No. 1 coal of the Old Kentucky Survey.

The immediate roof of this coal varies from a massive ledge of sandstone to a light gray, arenaceous shale with sometimes a few inches of black shale just above the coal. In extent this coal is not found above drainage anywhere in the county except on Mine fork and its tributaries and State Road fork and Panther Lick branch of Paint creek. On Browns fork of Lacey creek it shows 28 inches of coal with two thin partings near the top of the section. On Mine fork below Tick Lick branch it has 22 inches of solid coal and on Tick Lick branch 23 inches of solid coal. At Wheelersburg it shows 23 inches of coal without a parting, but on the remainder of Mine fork no openings were found. On State Road fork of Paint creek a thin coal just above drainage, doubtfully correlated with the Wheelersburg coal, shows only 11 inches of coal and on Panther Lick branch only 9½ inches.

The coal has a maximum observed thickness of 28 inches in the county and is the same as the thin coal mentioned above, a minimum thickness of 9½ inches. It will probably not be anywhere of economic importance in Magoffin county, though on Burning fork, about Ivyton, it should be found only 60 to 90 feet below drainage at several points, especially just below Ivyton on Middle creek. As the Wheelersburg coal is of workable thickness further down on Middle creek it might be worth boring for at the above mentioned point. Everywhere else under Magoffin county it will be below drainage and of unknown value.

The Wheelersburg coal has an estimated interval to the Fire Clay coal of 275 to 295 feet.

HOWARD COAL

Thirty-five to 50 feet, with an average of 40 feet above the Wheelersburg coal, is a coal found opened and exposed in a number of places on Mine fork, Lick creek, and the tributary branches of Little Paint creek, lying in the county. To it is given the name Howard, as it was first seen opened on James Howard's place on Mine fork. The interval from this coal to the Wheelersburg coal consists chiefly of sandstone, although beds of light gray, arenaceous shale are found in places. A thin coal not over 12 inches in thickness is sometimes found about halfway between the Howard and Wheelersburg coal, but as it is not a persistent coal, no name is given it. The Howard coal is usually split by one or more light gray fire clay or shale partings, the partings coming in the upper part of the section, and sometimes two to three feet in thickness. The roof of the coal is usually a light, shelly sandstone or a massive ledge of medium-grained sandstone and at times a soft, gray, concretionary shale.

Outside the small area where this coal is above drainage, nothing is known of it. On Brown's fork of Lacey creek it shows 17 inches coal and 18 inches shale; on Mine fork, 24 inches coal and 15 inches parting; on Flat fork, 24 inches coal and 6 inches parting; on Lick creek, 11 inches, and on Panther Lick branch of Paint creek a minimum thickness of 8½ inches. So far as is known the Howard coal is never of workable thickness in the county.

LACEY CREEK COAL

The Lacey Creek coal which gets its name from its being opened in a number of places on Lacey creek, comes 30 to 40 feet over the Howard coal and with an interval to the Fire Clay coal of 180 to 220 feet.

The Lacey Creek coal is thin and, with only a very few exceptions, a non-workable coal, where it is above drainage. On Mine Fork the roof is commonly massive or shelly sandstone with sometimes a few inches of arenaceous black shale directly over the coal. Outside of Mine fork, however, the roof is commonly a light gray sandy shale.

Except for a small area on Lacey creek of Mine fork, so far as is known, this coal has no area in the county with a thickness of over 30 inches. It is below drainage over approximately 95 per cent of the county and may or may not be worth shafting for. Outside of the Mine fork region and one opening a the head of Lick creek, the Lacey Creek coal has not been opened in Magoffin county.

This coal may be identified by its being the first coal below the Tom Cooper coal and coming 30 to 40 feet below that bed. There is no distinguishing feature in either the roof of the Lacey Creek coal or in the stratigraphy of its interval to the Tom Cooper coal.

On Mine fork and its branches the Lacey creek coal is extensively opened. Its thickness varies from 22 to 32 inches of solid coal. On Lick creek its maximum thickness is 30 inches with 5 inches parting, and its minimum thickness 4 inches. On State Road fork and the branches of Paint creek the Lacey creek coal has a maximum thickness of 30 inches and a minimum thickness of 10 inches, with an average of about 23 inches. Between Ivyton and the county line on Middle creek the Lacey Creek coal has a thickness of 16 to 19 inches.

TOM COOPER COAL

This coal comes 140 to 180 feet below the Fire Clay coal and 35 to 55 feet above the Lacey Creek coal. It is named from an exposure on the land of Tom Cooper on Lick creek where an excellent opportunity is afforded of obtaining its interval to the Wheelersburg and Lacey Creek coals. It has a maximum thickness of 48 inches in Floyd county adjoining the territory at the head of Licking River and has a minimum thickness of 2 inches in the State Road-Mash fork region. Its average thickness will probably be about 16 inches for that part of the county where it is above drainage. The bed is usually without parting and does not split.

In the region at the head of the river in Magoffin county, the Tom Cooper coal is everywhere below drainage. From the two exposures seen in that portion of Floyd county immediately adjoining Magoffin county there is a good chance that this coal may be 30 to 48 inches thick over much of the territory on Licking river from Puncheon creek up. It will be generally between 170 and 220 feet below drainage there.

The Tom Cooper coal where above drainage in the county is a non-workable coal. In no instance was it found missing where there was a continuous exposure of strata at about its stratigraphic position.

Wherever observed in Magoffin county, the Tom Cooper coal, with almost negligible exceptions, has a characteristic dark bluish-gray to black fissile shale roof which varies in thickness from a few inches to two and a half feet. Over this black shale is usually massive sandstone. The immediate black shale roof is of great aid in the correlation of the bed, though at times it will cause the Tom Cooper and the Whitesburg beds to be confused. The black shale roof of the latter bed, however, is blacker, harder, generally thicker, and more nearly a true slate than is the roof of the Tom Cooper coal. Near the head of the river where this coal is below drainage, this black shale roof is apparently lacking, such being the case in the two openings seen in Floyd county.

Because of its general thinness, the Tom Cooper bed is rarely opened in the county except on Mine fork, though a few openings occur in this bed in the region at the head of State Road fork and especially on the branches of Paint creek. There are also a few openings on Lick creek.

The interval between the Tom Cooper and the next higher coal, the Gun Creek coal, shows very generally in its lower portion a prominent bed of light bluish-gray to dark blue-gray shales generally soft and fissile, though sometimes thick-bedded and fairly hard. This bed is further characterized by discoidal, calcareous concretions ranging from a few inches in longest dimension to several feet. This bed of concretion-bearing shale is of great aid in the correlation of the Tom Cooper coal and will serve to distinguish it from the Whitesburg coal. Over the latter coal there is no such shale formation.

The Tom Cooper coal is easily correlated by its interval to the Fire Clay coal, by its usual black shale roof and by the above mentioned shale formation.

On Mine fork the Tom Cooper coal is from 11 to 24 inches thick. On Lick creek it varies from 12 to 27 inches with an average of about 18 inches. At the mouth of Pricy creek on Licking river it is 24 inches thick. At the mouth of Gardner branch it is 10 to 20 inches thick. On State Road, Mash fork and branches of Paint creek it varies from 2 to 22 inches with an average thickness of 14 inches. On Burning fork between Bradley and the county line, the thickness of this bed varies between 18 and 26 inches. On Licking river between the mouth of Lick Creek and Salyersville it is above drainage in only a very small area about the mouth of Elk creek. It has a maximum thickness here of 15 inches. On the Big Sandy side of the drainage divide at the head of Puncheon creek, in Floyd county, the Tom Cooper coal shows 20 inches of coal with 12 inches of parting. In Floyd county opposite the head of Howard branch the Tom Cooper bed shows a maximum observed thickness of 48 inches of solid coal. On the right side of Licking river from the point where the county line crosses it, to its head, the coal is below drainage except in a small area from Gardner branch near the mouth of Montgomery branch. Where exposed in this area it was from 10 to 20 inches in thickness.

COAL BETWEEN THE GUN CREEK AND TOM COOPER COALS

A thin local coal with a thickness of 4 inches was found 30 feet below the Gun Creek coal and above the concretionary shales which overlie the Tom Cooper coal at the head of Burning fork near Ivyton. This coal is separated from the Gun Creek coal by massive sandstone, This is a purely local coal, no coal having been found at this horizon anywhere else. In the section of this report in which Burning fork is treated this coal is called the Ivyton coal from its occurrence near that place.

Further down Burning fork a coal shows at this horizon which has a maximum thickness of 18 inches of coal with 3½ inches of parting. At times, even in this territory, this coal is totally absent.

GUN CREEK COAL

The Gun Creek coal has an interval of 42 to 67 feet to the Tom Cooper coal and comes 92 to 116 feet below the Fire Clay coal. The Gun Creek coal takes its name from the extensive development of this coal on Gun creek. This bed is not generally of workable thickness where above drainage in the county. At times, however, it is workable. It has a maximum observed thickness of 39½ inches of coal with 2 inches of parting just over the county line on Big Sandy drainage opposite the head of Puncheon creek at Gapville.

The maximum thickness of this bed in the county is 37½ inches of coal with a few inches of parting on the left fork of Middle fork above the mouth of Mill branch. It is quite frequently missing on or near the head of State Road fork of Licking river.

This coal is of workable thickness on Licking river between the mouth of Puncheon and the mouth of Gun creek where it is at or just above drainage. In places the coal changes to cannel or part cannel. An 18-inch bed of cannel coal on State Road fork of Paint creek belongs to the horizon of this coal. On Burning fork the bed carries some cannel coal at times in the lower portion. Generally the coal of the bed is typical soft, bright black coal.

This bed is very commonly badly parted and therefore at times is of no commercial importance. The roof is usually poor. It consists commonly of soft, light gray shale which is inclined to fall.

The Gun Creek coal should be well worth testing with a core drill on Puncheon creek and on Licking river from the mouth of Oakley creek to the head. A thin flint fire clay parting frequently occurs in this bed generally near the base. This is very typically flint fire clay, hard and flinty with a conchoidal fracture and a dull black gray color. If care is taken the Gun Creek coal will not be confused with the Fire Clay bed on account of this parting.

This coal is frequently opened in shallow openings on Burning fork, Mason fork, Gun creek and Middle fork. The usual absence of a black shale immediate roof will generally serve to distinguish it from the underlying Tom Cooper bed and the overlying Whitesburg bed. It usually occurs over the soft, gray, concretionary shale formation which lies over the Tom Cooper bed, but such shales are also found above it. The thin flinty parting is frequently an aid in the correlation of this bed.

In the region including Mine fork, Lick creek, State Road fork, Mash fork and Paint creek, the Gun Creek coal is between 18 and 20 inches thick, ranging from this thickness to total absence. On the left of Licking river, between the mouth of Lick creek and Salyersville, the Gun Creek coal has a maximum thickness of 22 inches of coal with 6 inches of parting. In the Burning fork-Gun creek area the Gun Creek coal has a maximum thickness of 36½ inches of coal with a few inches of shale and a minimum thickness of 12 inches, with an average of 22 inches of coal with several inches of parting. On Whiteoak creek it is a thin 6-inch coal where above drainage. Near the mouth of Johnson creek this coal should be above drainage, but no exposures were found. From the mouth of Middle fork to some distance up each fork it is above drainage and shows from 21 to 37 inches of coal, usually carrying one or more partings. In the region on the right of the river, from Middle fork to Oakley creek, the coal varies in thickness where observed from 10 to 28½ inches of coal, the greater thickness being on Auxier branch. On the right of the river from Oakley creek to its head the coal is below drainage.

WHITESBURG COAL

This coal comes 35 to 60 feet below the Fire Clay coal, and 45 to 65 feet above the Gun Creek coal. In the former reports of the Survey the name Whitesburg has been given to a coal bearing this relation to the Fire Clay coal and characterized by a black shale roof and this name is used in this report. The interval from this coal to the Fire Clay coal in Magoffin county is almost always shaly sandstone, although massive, sometimes calcareous sandstone and light gray shale are found in places. Over considerable areas on Mine fork and the head of State Road fork the roof over the black shale is massive sandstone. The strata composing the 45 to 65 feet interval to the Gun Creek coal varies from soft, light blue-gray, sometimes arenaceous shales with frequently large calcareous concretions with septaria marking, to light, grayish-yellow massive sandstone. In several instances a thin coal was found between the Whitesburg and Gun Creek coals. It is not persistent and only a few inches in thickness and hence of no consequence.

The Whitesburg coal is usually easily recognized by its roof, which consists of a hard, black, compact, fissile shale. This varies in thickness from a few inches to four feet or over. It is easily distinguished from other black shales coming above other coals, as for instance the Tom Cooper bed, in that it is harder, heavier, more compact, more fissile and very closely resembles slate. In only a few instances is this shale missing from over the coal, these being on Whiteoak creek, along the river below Johnson creek, and on that creek on the lower part. The coal, however, is poorly developed or missing in these places. Fossils of the genus *Lingula* were found in the roof of the Whitesburg coal on Beartree branch of Rockhouse fork of Burning fork.

The Whitesburg coal is a workable coal in only part of the county. It is above drainage over the greater part of the county, being below the main drainage only on the upper part of Licking river.

On Rockhouse creek, Whiteoak creek, Johnson creek and Middle fork this coal is thin and unimportant, showing only 9 inches of coal on Rockhouse, 12 to 20 inches on Whiteoak, 6 to 10 inches on the lower part and as much as 24 inches on the upper part of Johnson creek, and from 7 to 15 inches on Middle fork. It is very thin or entirely missing along Licking river below the mouth of Johnson creek. In the territory on the left of Licking river, between the mouth of Lick creek and Salyersville, the

Whitesburg coal is very badly split, thin beds sometimes being scattered through an interval of 40 feet or more, but chiefly below the usual horizon of the bed.

Above Middle fork along the river and on Stinson and Oakley creeks this coal averages only 15 inches or less of coal. On Half Mountain and other creeks on to the head of Licking river this coal is below drainage. On Mine fork this coal is not opened and hence nothing is known of its thickness. On Lick creek the Whitesburg coal ranges in thickness from 15 to 29½ inches, with a probable average thickness of 22 inches. On Lick creek the interval from the Whitesburg to the Gun Creek coals is largely massive sandstone. The bed is not badly parted on Lick creek.

The Whitesburg coal has its best thickness in the county on State Road fork, Mash fork and the branches of Paint creek which head in Magoffin county. The maximum thickness of the bed is near the head of State Road fork, where it is 63 to 65½ inches thick and solid coal. Such thickness is very local (see the section of the report which treats of this area). Just over the border of Magoffin county in Johnson county the Whitesburg coal has a thickness of 45½ inches with 11 inches of parting. The average thickness for the Whitesburg coal in the State Road fork, etc., area is 22 to 26 inches, although in many instances it is of workable thickness.

In the Burning fork, Mason fork and Gun creek region the Whitesburg coal is less than 20 inches thick in the southwestern part of the area; but about the head of Burning fork and on Gun creek it has a good area of workable or nearly workable thickness. Here it has a maximum of 34 inches and a minimum of 25 inches and is usually unparted.

On most of Puncheon creek the coal is badly split by a shale parting. On the Jaker fork the bed shows 30 inches of coal with, in some places, only 4½ inches of shale, but toward the south this parting increases and on the right fork or Main creek it has increased to 10 feet of shaly sandstone. On Salt Lick branch and on to the head of the river this coal is below drainage.

The Whitesburg coal is above drainage and has good area in much of the lower part of the county. On Mine fork, however, it is too high in the hills to have much area. Over most of its extent, however, it is unworkable. At a future time when a coal between 24 to 30 inches is considered workable, the Whitesburg coal should be of economic value on parts of Lick creek, the State Road fork region, and the Burning fork region. Though this coal is occasionally badly split, it is generally unparted. So far as is known, the Whitesburg coal is never completely lacking in the section.

The coal is generally soft, bright block coal in its upper third; the lower two-thirds of the bed frequently has much hard, dull, impure coal which, however, is reported to burn well. A few inches of cannel coal or semi-cannel coal were found at the bottom of the bed on Beartree branch of Rockhouse branch of Burning fork, but this is the only case where cannel coal was found in the bed in Magoffin county.

The Whitesburg coal has been opened twice on Mine fork, possibly ten times on Lick creek, and very abundantly in the State Road and Burning fork area.

The Whitesburg coal is usually easily correlated by its peculiar black shale roof. Locally the nature of the coal is of assistance in the correlation. It will rarely, if ever, be confused with either the beds lying above or below it.

The roof of the Whitesburg coal generally holds well and requires little timbering.

COALS BETWEEN THE WHITESBURG AND FIRE CLAY COALS

Between the Whitesburg and Fire Clay coals several thin coals are sometimes present. In places there are as many as five of these. Most of them never attain a thickness of over 12 inches and are not persistent over much area. In one instance, however, on Burning fork a 22-inch bed of coal under a massive sandstone is found 18 to 24 feet over the Whitesburg coal. These coals are probably either low splits of the Fire Clay coal or upper splits of the Whitesburg.

FIRE CLAY COAL

This coal is the most important key-rock found in the county. It is known over the Eastern Coal Field as the

Fire Clay, Hyden or Dean coal, and has been invaluable as an aid in correlating the coals of this field because of the peculiar flint fire clay parting which is nearly always present at some place in the bed section of the coal. It is found both on top and at the bottom of the coal but usually toward the center of the section. This parting consists of from 1 to 5 inches, with an average of 3 inches of a very flinty, non-plastic fire clay. It is usually of a dark brown or chocolate color, but varies from a dull black to a light grayish white. It breaks with a conchoidal fracture and in places small specks of pure flint are found in it. On a close examination a fresh fractured surface of the flint fire clay, small light brownish, thin streaks and spots may be seen which aid in the identification of the parting. On exposure to weathering agents the flint fire clay soon chips up into finer and finer angular fragments, and disintegrates altogether. On weathering, the surface of the flint fire clay frequently takes on a light gray to white coating. The horizon of the bed may often be determined at some distance by this light colored surface of the float and also often by a mass of small whitish chips in the soil which represent the partially disintegrated parting.

At one place, Vanderpool branch, a small branch on the left of Licking river between Salyersville and the mouth of Salyers branch, the flint fire clay parting was found in two distinct layers separated by 7½ inches of coal. The upper portion of the parting is 2 to 4 inches thick, the lower ½ inch thick. A thin parting about ¼ inch in thickness is found in the Gun Creek coal. This parting is hard and flinty, non-plastic and resembles to a marked degree the parting of the Fire Clay coal. A parting also sometimes occurs near the base of the Hazard coal. This parting has the texture and color of the flint fire clay parting, but becomes plastic when left in water. When dried, however, it has a conchoidal fracture and presents many of the characteristics of the flint fire clay parting of the Fire Clay coal. When once seen in its characteristic development, however, the flint parting of the Fire Clay coal cannot easily be confused with anything else.

The position of the Fire Clay coal in the stratigraphic section varies since the measures below it are thicker in the eastern and southern part of the county than in the western. At Cannel City in Morgan county, only a short distance west of the county line, there are about 303 feet of strata between the Fire Clay coal and the top of the heavy sandstone under the Wheelersburg coal and 696 feet to the base of the Pottsville. On Middle fork the distance from this coal to the top of a massive sandstone 85 feet thick, which is probably the same sandstone, is 439 feet and 854 feet to the base of the Pottsville. On Beaver creek in Floyd county, 3 miles east of the southern part of the county, the distance from the Fire Clay coal to the top of the sandstone is about 810 feet and to the base of the Pottsville about 1,232 feet. Because it is easily recognized on account of its parting, this coal is used as a "key" horizon for working out the structure of the rocks up the county and is the bed on which the contours of the structure contour map are drawn.

The roof of the coal is usually a massive sandstone which is at times 35 feet thick. Sometimes this sandstone is as much as 20 feet above the coal and bluish gray shale comes between. In such cases there is usually a thin coal known as the Fire Clay Rider just beneath the sandstone.

The coal of the Fire Clay bed bears the reputation everywhere of being an excellent domestic coal. It is usually a mixture of block and splint coal, with sometimes one or more benches of cannel coal.

The Fire Clay coal is above the main drainage over nearly the entire county, being below only on Licking river from Long branch to Grassy creek. It is a workable coal only over certain areas, its bed section varying from only an inch or two of coal to a little less than 4 feet. From the head of Licking river to Grassy creek it shows from 36 inches to 40 inches of coal and is at or just above drainage level. In that area where it is under drainage it probably maintains a thickness of 36 to 48 inches, as openings just over the county line in Floyd county, where the coal is above drainage, show it to have such a thickness. However, where the coal comes above drainage below Long branch it is thin, showing only 14 inches of coal. On Puncheon creek it varies from 0 to 20 inches in thickness. On Dutton creek and the upper part of

Oakley and Half Mountain creeks the coal is also thin, showing less than 20 inches coal, but near the mouth of Half Mountain, along the river down to Montgomery branch, and on the lower part of Oakley creek, it shows from 28 to 36 inches of coal. On Stinson creek the coal is thin, showing less than 20 inches coal where seen. Along the river to Middle fork and throughout Middle fork and Johnson creek it is largely cannel coal in a small area. On the upper part of Grape creek and Whiteoak creek it is less than 18 inches in thickness, but on the lower part of Whiteoak creek, Grape creek and along Licking river from Grape creek to Trace branch it shows from 28 inches to 42 inches of coal, and is low in the hills.

On Gun creek the Fire Clay coal is of workable thickness in the lower part of the creek, but in the upper portion from below the forks up it is badly split and not of workable thickness. Along Licking river on the left between the mouth of Gun creek and Mason fork the Fire Clay coal is generally of workable thickness. It has a maximum thickness of 38 inches in this area, but averages about 30 inches. On Mason fork the coal has been opened 20 inches and 35 inches thick. It should average 28 inches thick on this creek. On Burning fork the Fire Clay coal shortly above Bradley becomes too badly split and thin to be workable. On Rockhouse fork of Burning fork the bed will probably be found to average 28 inches thick and will be of workable thickness in places. On State Road fork and those branches of Paint creek which drain portions of Magoffin county the Fire Clay coal is generally too thin and too much split to be workable. On State Road fork, from a short distance above the mouth of Mash fork to Saylersville, the bed will be found workable and attain a maximum thickness of 45 to 46 inches with about 3 inches of parting. The Fire Clay coal is only known to be of workable thickness in the State Road fork district on Town branch at Salyersville, but will probably be workable in the lower part of Mash fork as well. Between Salyersville and the mouth of Lick creek, on the left of Licking river, the Fire Clay coal ranges from 18 inches to 34 inches in thickness.

On Lick creek the Fire Clay coal is too thin to be of workable thickness above the mouth of Buffalo creek. From just above the mouth of Buffalo creek on Lick creek to the mouth the Fire Clay coal has an average thickness of about 30 inches. On Mine fork the Fire Clay coal is too thin to be worked and is also so high on the hills as to have little or no area. On Rockhouse creek the coal is thin, showing less than 20 inches of coal. It is below drainage on much of this creek, especially on the north side of the Caney fault. On Pricy creek and Ben Branch this coal is entirely cannel coal and the flint parting is absent.

The Fire Clay coal thins markedly and becomes very badly split in the portions of Mine fork, Lick creek, State Road fork and Burning fork which adjoin Johnson county. In this territory the flint fire-clay parting also loses its characteristic features and ceases to be useful in the determination of the horizon of the Fire Clay coal. Where the flint fire-clay parting is absent or has lost its distinguishing features the massive, light gray, muscovitic sandstone which generally overlies the bed may be of assistance in the correlation of the coal. The massive sandstone can only be used of course in regions where it is known to be developed over the fire clay bed and care must be taken not to confuse it with higher or lower massive sandstone.

FIRE CLAY COAL RIDER

A thin coal is often found, varying from 5 to 25 feet, above the Fire Clay coal. This coal has been called the Fire Clay Rider in previous reports of the Survey, and this name is used herein. The interval to the Fire Clay coal is always shale, which often becomes so arenaceous that it is nearly shaly sandstone. Small ferruginous concretions of the size and shape of peach stones locally occur in this shale. Above it is usually a massive sandstone. The Fire Clay Rider has a maximum thickness of only 25 inches coal in the county, but will probably not average over 12 inches in thickness, and is therefore of no commercial value.

Where the 30 to 35 feet over the Fire Clay coal is shale the Hamlin and Fire Clay Rider coals can only be distinguished by the smaller interval of the latter. When, however, this interval contains a massive sandstone the Hamlin coal comes above this sandstone and the Fire Clay Rider below it.

The Fire Clay Rider is frequently entirely lacking. This is in most cases due apparently to this bed having been cut out by the massive sandstone above it.

HAMLIN COAL

From 30 to 50 feet above the Fire Clay coal is a coal, usually thin, but sometimes reaching a thickness of 28 inches. In Series IV, Volume III, Part III, of the Kentucky Geological Survey, Mr. Hodge gives a coal 70 to 80 feet above the Fire Clay coal and 100 feet below the Haddix coal which he calls the Hamlin coal. This gives a much greater interval between the Haddix and Fire Clay coals than is found in Magoffin county. However, his Hamlin coal comes about half way between these coals. The coal here called Hamlin occupies the same position relative to the Haddix and Fire Clay coals, and for this reason is correlated with the Hamlin coal of Hodge.

The interval to the Fire Clay coal or its rider, when the latter is present, consists, as a rule, of massive sandstone, often becoming shaly near the top.

The Hamlin coal is not persistent over the entire county. It is only very rarely a workable coal, its average thickness being about 18 inches. At one place it shows a thickness of 33 inches. The coal is best developed in the following areas: On the upper part of Licking river above Brushy creek, where it shows 28½ inches as a maximum and 14 inches as a minimum thickness; on Puncheon creek, where it shows as much as 28 inches of coal with a thin parting; and opposite the mouth of Puncheon creek, where the greatest thickness of 33 inches was found. On the right of Licking river from Half Mountain creek north to the county line this coal does not attain a thickness of over 24 inches, its usual thickness being about 14 inches. It is missing on parts of the left fork of Middle fork and much of Johnson creek. On Grape creek and the lower part of Whiteoak creek it has a local thickness in places of 18 inches of solid coal, but on the lower part of Licking river and on Rockhouse creek is apparently missing. On Mine fork nothing is known of the thickness of this bed and it is apparently lacking in a number of instances. One thin coal bloom was found at the horizon of the Hamlin coal on Mine fork.

On Lick creek there are several openings into the Hamlin coal. In only one instance could the thickness be obtained and here it was 18 inches. The Hamlin coal is probably unworkable throughout the area drained by Lick creek.

In the area on the left of Licking river, from the mouth of Lick creek to Salyersville, nothing is known of the Hamlin coal beyond the fact that it is non-persistent and that the bloom of the bed, where seen, appears thin. In the State Road Fork area the Hamlin coal appears to be entirely absent. In the Burning Fork district the Hamlin coal is not persistent. It has a maximum thickness here of 28 inches and is unworkable, as it will not average over 24 inches in thickness over any considerable area. In the area from Trace fork to the head of the river the Hamlin coal does not attain workable thickness. Its maximum thickness here is 28 inches with 2½ inches of parting.

The Hamlin coal is frequently badly parted and sometimes splits into thin beds; the different splits in some instances ranging as much as 20 feet apart. The roof of the Hamlin coal is usually poor, in the majority of cases being sanding shale. Rarely, if ever, is there a black shale roof. The Hamlin coal never carries any cannel coal in Magoffin county.

HADDIX COAL

This coal, sometimes called the Limestone coal, is the first coal below the Fossil limestone. Its interval to the limestone varies from 4 to 25 feet and consists usually of dark-blue shales or shaly sandstone, whenever the limestone is present above it. When it is missing the massive sandstone, usually found above the limestone, rests down on the coal. The interval from the Haddix to the Fire Clay coal varies from 45 to 76 feet. This is largely sandstone, especially in the lower part of the interval. Sometimes it is fine-grained and massive, and again shaly, in fact usually so in the upper part of the interval.

The maximum thickness of the Haddix coal is 62 inches of excellent coal, and its minimum thickness 0 inches, as it is missing altogether in a few places. Often it consists of several thin coals scattered through an interval of as much as 25 feet. Over much of the county, however, this coal is only a few inches in thickness.

In character the coal of the Haddix bed varies from a mixture of block and splint coal to splint and finally a high grade cannel coal.

As a workable coal the Haddix coal is restricted to certain localities. On Will branch it shows a thickness of 36 inches with a 4-inch parting, and at the mouth of Molly branch only 18 inches. On Salt Lick branch and Puncheon creek the coal is thin, showing 24 inches of coal as a maximum.

In the Burning fork, Gun creek, Mason Fork area nothing is known of the Haddix coal and it is thought to be absent over much of the area, as a number of sections fail to show any coal bloom at its horizon. If present it is undoubtedly a very thin bed.

In the State Road Fork area a fairly persistent bloom was found at the horizon of this coal. The bloom in most cases appeared to be that of a thin bed. At the only place where the Haddix coal was opened, however, the bed was 45 inches thick with 3 inches of parting and 8 inches of cannel at the base. A. R. Crandall, Bull. 10, Ky. G. S., measured the bed here and found 51 inches of coal, 7 inches of cannel coal at base and 4 inches of shale parting. It is doubtful whether the Haddix coal has this thickness over much area. Where the chances are best for being a thick bed the coal is so high on the hills as to have but small area.

In the territory on the left of Licking river, between Salyersville and the mouth of Lick creek, the Haddix coal is valuable cannel coal 36 inches thick in a restricted area on Colvin branch. The cannel coal thins, however, in all directions in this territory from Colvin branch and soon loses its cannel character. This coal is probably not of workable thickness over a large part of this area.

On Lick creek the Haddix coal will probably not be of economic importance. Outside of a bloom, apparently that of a thin bed, found in several sections, nothing is known of the bed here. Over much of the area drained by Lick creek the coal will be so high on the hills as to have relatively small area. On Rockhouse creek it shows a maximum observed thickness of 62 inches, but this is a local development; on the greater part of the creek it is thin and not of commercial value. On the lower part of Mine fork the coal is missing or present only in the tops of the highest hills. In the area between Half Mountain creek and Trace fork the Haddix coal is very thin; it is always, as far as known, less than 3 inches thick and is frequently lacking. From Trace fork to the head of Licking river the most favorable bed-section of the Haddix coal from a commercial standpoint is 34 inches of coal with 5 inches of parting. Locally it may be of workable thickness, but generally it will be found too thin or too much parted to be valuable.

On Oakley creek it shows a maximum thickness of 20 inches. Throughout Middle fork it is usually split into several thin coals, the maximum thickness of any one of them not exceeding 14 inches. On the upper part of Johnson creek the coal is very poor, and is either missing or from 2 to 10 inches in thickness, but on the lower part it shows a maximum thickness of 48 inches and may average 36 inches of excellent coal for a distance of four miles up the creek. On Whiteoak creek the coal is only a few inches in thickness, judging from the few exposures found. On the lower part of Grape creek it shows 30 to 33 inches of excellent coal, but at the head is only a few inches in thickness.

The Haddix coal is above the main drainage throughout the county. In places it is high in the hills, but in most cases where known to have a workable thickness it is fairly low in the ridges and would underlie a good area. The roof of this coal is generally light-gray shale, though sometimes massive sandstone as on Colvin branch and the adjacent territory.

TRACE FORK COAL

This coal has an interval to the Fire Clay coal of 94 to 125 feet and an interval to the Fossil limestone of 7 to 30 feet. The maximum interval to the Fire Clay coal mentioned above is exceptionally high, the average interval being 105 feet.

This coal is named from its frequent occurence on Trace fork and from the fact that one of the two places where it is opened and shows its maximum thickness is on Trace fork. This bed is very thin and is of practically no economic importance as it has relatively no area of workable thickness. It is, however, a fairly persistent coal horizon.

The maximum observed thickness of the Trace Fork coal is on the left of Licking river, just below the mouth of Salt Lick, where it shows 26 inches of coal, the lower 15 inches being semi-cannel coal. On Trace fork this bed shows 18 inches of coal with a reported thickness of 3 feet. In many places it is lacking. In places, as about the mouth of Salt Lick branch, the coal of this bed grades into cannel coal in the lower portions. Elsewhere, however, the coal is always block and splint coal.

On Lick creek, Mine fork and Rockhouse creek the Trace Fork coal is split into two thin beds with 3 to 5 feet of shale between them. The interval of this coal to the limestone is at times soft gray shale, but usually shaly sandstone. Over much of the region at the head of Licking river this coal lies immediately below a massive sandstone. In several instances the horizon of the Trace Fork coal is represented only by thin, discontinuous coal streaks and plant imprints cross-bedded in the base of this massive sandstone.

The only area in which the Trace Fork coal approaches workable thickness is in the territory adjoining Licking river between Puncheon creek and Trace fork.

YOUNG COAL

In Series IV, Volume I, Part 2, in a report on the coals of the north side of the North fork of Kentucky river, by J. M. Hodge, a coal is reported occurring half way between the Haddix and Hazard coals, which is there called the Young coal. In Magoffin county a coal is found occupying a similar stratigraphic position, and the name "Young" is used in this report to designate it. This coal comes 52 feet to 80 feet above the Fossil limestone and 135 to 160 feet above the Fire Clay coal. The strata between it and the limestone vary in thickness and character, in places consisting entirely of massive sandstone.

Again they are at least half shales, which are usually of a dark bluish-gray color. The latter is the case, however, when the coal is apparently split into a number of thin coals.

In many instances, the number sometimes reaching five, thin coals are found below the main bed of the Young coal. The Young coal wherever seen is a mixture of block and splint coal of good quality. Cannel coal was not found in this bed. This coal is above drainage over practically the entire county, but varies considerably in elevation in different parts. It is usually a workable coal and one of the valuable commercial coals of the county.

The maximum observed thickness of the Young coal is 68 inches of coal with 14 inches of parting on Bullmire creek and 50 inches of solid coal on Bull creek. From this maximum thickness the Young coal decreases and in many places is entirely absent, being frequently entirely cut out by massive sandstone. The roof of this coal varies from gray, sandy shale to massive sandstone.

In the Oakley Creek-Half Mountain district, the bed commonly has a few inches of cannel slate lying immediately over the coal. From Whitley creek to the head of Licking river, on the left, the bloom of the Young coal was seen in places, but no openings were found and no opportunity of measuring the bed was afforded. From Trace fork to the head of Licking river, on the right, the Young coal has a maximum thickness of 50 inches of solid coal and a minimum thickness of 17½ inches. So far as the evidence goes it may be expected to have an average thickness of 34 to 38 inches over this area. In the territory between Whitley creek and Puncheon creek, on the left of Licking river, the Young coal where exposed showed a maximum thickness of 19 inches for a number of thin beds which represent the coal there. Elsewhere in this territory the Young coal is not exposed or opened.

On the right of Licking river between Trace fork and Oakley creek the Young coal is usually very badly split. It, however, will probably be found of workable thickness locally in this area, as it has its maximum thickness of 68 inches with 13 inches of parting on Bullmire creek.

On Oakley creek one opening, partly covered, was reported to show 48 inches of coal. On Boardtree fork of Left fork of Middle fork it shows 16 inches plus of coal in one exposure; on Spruce Pine fork of the Left fork of Middle fork it shows 40 inches coal, and on Crafts fork of the same creek 30 inches. At the head of the Right fork of Middle fork various openings show this coal 38 inches, and a caved opening was reported to have shown 48 inches of coal. On Grape creek and Whiteoak creek the lack of openings leaves the thickness of this coal unknown.

In the Burning Fork-Gun Creek-Mason Fork region the Young coal has been opened up only once on Rocklick fork of Rockhouse fork of Burning fork. Here it showed 41 inches of coal with 3 inches of parting. Usually it appears to be split in this region and will probably not be of workable thickness generally. It has small area here.

In the State Road Fork region nothing is known of the thickness of the Young coal. A fairly persistent coal bloom comes here high in the hills and with little area at the horizon of this coal. Nothing is known of the thickness of this coal in the territory on the left of Licking river between the mouth of Lick creek and Salyersville. It is probably not a thick bed here, although it may be of workable thickness over much of the area which it underlies.

On Lick creek the Young coal is opened once with a thickness of 30 inches. It will probably not be of economic importance on this creek owing to its small area. On Rockhouse creek this coal has a maximum observed thickness of 28 inches solid coal. On Mine fork the coal is missing from all except the very highest knobs.

WHITTAKER COAL

The Whittaker coal is a coal coming between the Young and Hazard coals. The coal takes its name from the excellent exposure of the bed on Grassy creek in an opening belonging to Mr. J. M. Whittaker, where it shows 109 inches of coal practically uninjured by partings. The Whittaker coal is best developed in the surrounding territory.

In the lower portion of Magoffin county there is also a bed which comes between the Hazard and Young coals. This coal is fairly persistent and is believed to correlate with the Whittaker coal. As this bed is only opened once, on Cripple creek, the correlation with the Whittaker coal is based entirely on stratigraphic position. While the bed, which comes between the Hazard and the Young coals, is called the Whittaker coal throughout this report, it should be borne in mind that only in the territory at the head of Licking from Bullmire and Salt Lick branches to the head of the river could the Whittaker coal be actually traced through from opening to opening and surely identified as the same bed.

The Whittaker coal has an interval of 175 to 195 feet to the Fire Clay coal in the lower portion of Magoffin county and comes 36 to 50 feet above the Young coal, about midway between the Young and the Hazard coals, but a little closer to the Hazard than to the Young. In the lower portion of Magoffin county the Whittaker coal is not known to be of workable thickness. It is only exposed in one place and is there 16 inches thick. A coal bloom at the horizon of this coal on Lick creek was reported to be 3 inches thick. At times the Whittaker coal is totally lacking, but generally a coal bloom is found at the horizon of this bed.

At the head of Licking river the Whittaker coal has a maximum thickness of 109 inches with 7 inches of parting. From this thickness it decreases to 0 inches, being apparently totally lacking in places, as on Puncheon creek. The coal of this bed is in all cases a mixture of block and splint coal with a large percentage of block coal. It becomes very badly parted above the mouth of Grassy creek and is probably valueless at the extreme head of the river. This coal is everywhere above drainage in Magoffin county and has good area except in the portions of the county where the strata are high because of uplift.

The roof of the Whittaker coal at the head of Licking river is light-gray shale overlain by massive sandstone. Five to eight feet over the top of the coal in this area is a thin bed of coal 8 to 14 inches thick. This rider to the coal is of assistance in the recognition of this bed in the territory at the head of Licking river. The interval of the Whittaker coal to the Young coal at the head of the river is usually largely massive sandstone.

From Trace fork to the head of Licking river, on the right, the Whittaker coal has a maximum thickness of 65 inches solid coal on Bull creek and a minimum thickness of 17 inches. It will probably average 40 to 42 inches thick over most of this territory. At the extreme head of the river the bed becomes badly split.

In the Trace Fork to Half Mountain Creek region the coal has only been exposed in two places, though the bloom of this bed is seen elsewhere. On Bullmire branch it has 20 inches of coal and 6 inches of parting and on Buck branch it showed 21½ inches of coal with 4 inches of shale parting.

On Grassy creek the coal is 109 inches in thickness, and thins gradually to Howard branch, where it is only 40 inches thick, an average thickness being about 50 inches of coal. On Whitley creek, Long branch and Salt Lick branch it shows only 25 inches of coal. No exposures of the coal were found on Puncheon creek. In the Burning Fork-Gun Creek district the Whittaker coal has not been opened. The bloom of this coal bed was dug into northeast of Ivyton and was reported to be over 2 feet thick, but outside of this doubtful evidence nothing is known as to the thickness of the coal here. The bed is at times entirely cut out by massive sandstone.

In the State Road Fork district the Whittaker coal has been opened at one place, but the opening is now caved. A good bloom shows near the head of State Road fork, but the bed will have little area there as it is high on the hills. In the territory on the left of Licking river, between the mouth of Lick creek and Salyersville, this coal has been opened only on Cripple creek, where it shows a thickness of 16 inches. The bloom of the bed is fairly persistent in this district, but the coal will probably not be of workable thickness. In the Lick creek region the bloom of this bed has been frequently observed, but as there are no openings into or exposures of the bed nothing is known as to its thickness. On Mine fork the bed does not exist in any but the highest hills and the bloom of the bed was not seen.

No openings into this coal were found on the right of Licking river from the country line to Oakley creek. However, the bloom was seen in a number of places and in two instances a 12 to 14 inch coal is found at the horizon of this bed.

HAZARD COAL

This coal is one of the commercial coals of the county. It lies from 110 to 160 feet above the Fossil limestone and from 190 to 240 feet above the Fire Clay coal, the interval to the latter being unusually constant at close to 200 feet. It is also found 55 to 90 feet below the base of the lower of two sandstone cliffs which are prominent in different sections of the county. The interval from this coal to the Young coal, or to the Whittaker coal when the latter is present, is massive sandstone with few exceptions. In a few instances this sandstone shows in ledges on the hillside. Whenever the interval is not massive sandstone it is shaly sandstone with some shale interbedded.

The Hazard coal is above the main drainage over the whole county, and is high in the hills over much of it, but varies in elevation in different sections. The coal of this bed is the usual mixture of block and splint coal except on Whiteoak creek, where it is an excellent block cannel coal. The thickness of this coal is more constant than all the other coals below it. The maximum thickness, where seen, was 72 inches of coal, and it has an average thickness of at least 36 inches.

The Hazard coal is a remarkably persistent bed throughout the county and contrasts very strongly with the Young coal and certain others of the lower beds in this respect. The bed does not usually split up into thinner beds as do most of the other coal beds, although by this it is not meant to imply that the bed is without parting. From Oakley creek to Buck branch the Hazard coal generally has some cannel slate in the lower part of the roof, and this aids in the identification of the bed locally in this region. From Salt Lick branch to the head of Licking river, on the left, no openings were found into this coal. At the head of Howard branch, however, 18 inches of the bloom of it was seen. At the head of Salt Lick branch it shows 34 inches solid coal, and on

Puncheon creek, at the one opening into it, 38½ inches coal injured by partings.

In the region from Trace fork to the head of Licking river the Hazard coal has not been opened except on Trace fork, where it is 25¾ inches thick in the opening where the bed section was obtained. In two completely caved openings it was reported to have had a thickness of 42 to 48 inches, with 6-inch parting in the latter instance. The Hazard coal is believed to be thin over this territory as a whole. In the territory from Trace fork to Half Mountain creek the Hazard coal has a thickness of 30 inches or over only on Half Mountain creek. From Half Mountain creek to Trace fork this coal has a maximum observed thickness of 27 inches. On Half Mountain creek the coal attains a thickness of 42 inches, but the average for the creek will probably be between 30 to 36 inches. Near the head of Half Mountain creek, due to the dip of the creek and the exceptional height of the hills at the divide and county line, the Hazard coal will have very good area.

On Oakley creek an average of the bed sections is about 40 inches of coal. The coal is low in the hills on this creek; likewise throughout the headwaters of the two forks of Middle fork, where it varies in section from 24 to 72 inches, with an average of probably 40 inches or more of coal. On Johnson creek, near its head, two openings showed 32 and 52 inches of coal, but on the lower part of the stream openings show it to be from 28 to 34 inches in thickness. The coal is high in the hills on the lower part of both Johnson creek and Middle fork. An opening on Grape creek showed 26 inches plus coal. On Whiteoak creek the bed section varies from 15 to 32 inches of block cannel coal.

In the Burning Fork district no opportunity was afforded of measuring the Hazard coal. At a number of points a strong coal bloom was found at the horizon of this bed. Prof. Crandall, in Bull. 10, Ky. G. S., reports a coal 30 inches thick on Middle creek, Johnson county, 2½ miles from the county line, which comes at the horizon of the Hazard coal. The coal has little area in this district. Nothing is known of the thickness of the Hazard coal in the State Road Fork district. A coal bloom was reported at this horizon in one place. The coal will have too small an area to be of economic importance in this district. In the territory on the left of Licking river, between the mouth of Lick creek and Salyersville, the Hazard coal was only exposed in one place, where it measured 18 inches. This coal will have but small area in this region, generally speaking.

Nothing is known of the Hazard coal on Lick creek or Mine fork. It will not be of economic importance in these regions, being too high on the hills to have much area. On Rockhouse creek no openings or exposures, other than the bloom, of the coal were found.

COAL BETWEEN THE HAZARD AND FLAG COALS

In the lower part of Magoffin, in several instances, a coal bloom or several blooms have been found between the Hazard and the Flag coals. But as the occurrence of these blooms is rare and they apparently have little or no thickness and no persistency they have not been given a name or much mention.

In the region between Trace fork and the head of Licking river a coal bed was found in a number of places between the Hazard and Flag coals. This coal has an interval of 220 to 232 feet to the Fire Clay coal (assuming the interval between the fossiliferous limestone and the Fire Clay coal to be 80 feet). This coal has been opened in one and possibly two places and in one case was reported to have shown a thickness of 3½ feet of solid coal. At another point on Trace fork a coal bed with an interval of 230 feet to the Fire Clay coal shows 51 inches of coal and 6 inches of parting. There is a possibility that this interval of 230 feet is too low and that this latter coal is the Flag coal. This coal comes about half way between the Flag and Hazard coals and appears to be a coal which is locally developed at the head of Licking river.

FLAG COAL

Thirty to 70 feet above the Hazard coal is a coal which is called "Flag" in former reports of the Survey. Above this coal is a massive coarse-grained sandstone, the lower of two cliff-forming sandstones—the High

Rock sandstone, which is often seen forming vertical cliffs. The interval from the base of this sandstone, or rather from the base of the cliffs, as the lower portion of the sandstone frequently does not form cliffs, varies from 18 to 40 feet. However, whenever the High Rock sandstone fails to form a cliff and the one next above it does, as is the case over much of the county, the interval of the Flag coal to the base of the cliff varies from 60 to 110 feet.

The interval between the Flag coal and Fire Clay coal varies from 250 to 290 feet. Between the Flag and Hazard coals is massive sandstone, which occasionally stands out in thin ledges. Sometimes this sandstone is thin-bedded or shaly. A thin coal bloom was found in several places between these coals, but generally is not over a few inches in thickness.

The Flag coal is above drainage throughout the county and as a rule high in the hills. This probably accounts for the scarcity of openings into it. The thickness of the coal at the few openings seen varies from 27 to 46 inches of solid coal. Only two openings into it were found on Licking river above Oakley creek, one on Trace fork showing 51 inches of coal and 6 inches parting, and another in the head of the river shows 36 inches. On the right fork of Trace fork, Bullmire, Buck, Half Mountain and Oakley creeks, and the headwaters of the two forks of Middle fork this coal is low in the hills, having especially good area near the heads of these streams, and its thickness should be investigated, as openings across on the Quicksand waters show it to have a good thickness.

On Johnson creek the coal shows a thickness of from 28 to 30 inches of solid coal at the openings found. On Elk fork, just below Salyersville, it shows 35 inches of coal; on May branch, 32 to 36 inches, and opposite the mouth of Grape creek it was reported 24 inches thick. Throughout the remaining part of the county no openings were found into this coal.

The Flag coal is a remarkably persistent coal and is commonly without parting, and is known to split into small beds. It will, at times, carry cannel coal, as cannel coal was reported at this horizon at various points in the county, and this bed carries cannel in the Quicksand

Creek region. The roof of the bed is light gray, sandy shale or massive sandstone.

FLAG COAL RIDER

Ten to 30 feet above the Flag coal is a coal which was found opened in only two places in the county. It is here designated the Flag Coal Rider. It is found between the Flag coal and the base of the lower sandstone cliff, the interval to the Flag coal being massive or shaly sandstone. At the two places where opened, one at the head of Grassy creek and on Licking river nearly opposite Grape creek, it showed 28 and 12 inches of coal respectively. Its bloom, however, was seen in a number of places. Whether this coal is of commercial value must be determined by prospecting. It would, however, be high in the hills over the greater part of the county and entirely removed by erosion on Mine fork and the greater part of the Lick Creek and State Road Fork areas.

FUGATE COAL

In a report on the coals of Troublesome creek, by J. M. Hodge, Ky. G. S., Series IV, Volume III, Part III, he describes a coal 80 to 100 feet above the Flag coal and gives to it the name Fugate. The coal herein called Fugate has not been traced through from Troublesome creek, but is so named because it seems to correlate with the coal of that region through its relative position with respect to the other coals and also its stratigraphic position and thickness of bed section.

This coal in Magoffin county is found 50 to 70 feet above the Flag coal, coming immediately on top of the lower of the two cliff-forming sandstones. Its interval to the Fire Clay coal varies from 290 to 340 feet, an average being about 320 feet. Above it is 80 to 90 feet of massive sandstone, the upper 50 to 60 feet being the upper of the two cliff-forming sandstones. In parts of the county these sandstones unite and cut out the coal altogether.

This coal is high in the hills wherever present at all in the county. In the greater part of the county it has been removed from the ridges by erosion. It would have its greatest area in the ridge between Magoffin and Breathitt counties.

On Puncheon creek and Salt Lick branch, where numerous openings are found, this coal shows a thickness of from 42 to 55 inches of excellent coal, with only an occasional 1 to 2 inch parting. Near the mouth of Grassy creek an opening shows 42 inches of coal and 19-inch parting. On the left fork of Trace fork it measures 51 feet coal and 19½-inch parting, and at the head of Straight fork of Licking river 46 inches of coal and 4-inch parting. At the mouth of Spruce Pine fork up the left fork of Middle fork an unfinished opening showed a 30-inch coal bloom. At the head of Johnson fork the coal is evidently missing, having been cut out by the massive sandstones. In the other parts of the county where this coal should be present—principally in the ridge between Magoffin and Breathitt counties—no openings were found.

The roof of this bed is either massive sandstone or light gray, sandy shale. Over much of Puncheon creek the Fugate coal lies immediately under a fine-grained, massive sandstone. On Trace fork and at the head of Straight fork the roof is light arenaceous shale.

HINDMAN COAL

A coal bloom 130 to 140 feet above the Flag coal was found in three places. This coal, judging by its interval to the Flag coal, is the Hindman coal of previous reports of the Survey, and is called Hindman in this report. The points at which these blooms were found were at the heads of Half Mountain creek, Crafts fork of the Left fork of Middle fork and on Johnson creek. At the last named point a heavy coal bloom was seen, indicative of a coal bed at least 4 feet in thickness. The coal would underlie a very small area in Magoffin county. It will have the best area in the divide at the Magoffin and Breathitt county line between the head of Buck creek and the head of Oakley creek.

COALS ABOVE THE HINDMAN

At the head of Johnson creek there are two coal blooms, one 20 feet and the other 28 feet above the Hindman. At the head of Beetree fork of Oakley creek, a cannel coal bloom was found 350 feet above the Flag coal and 200 feet above the Hindman. At the head of Howard branch of Licking river, a coal bloom 190 feet above the Flag coal was found. Nothing is known of these coals other than that they would underlie a very small area in the county.

WHITEOAK CREEK

That part of the Left fork of Whiteoak creek lying in Magoffin county drains an area of approximately 10 square miles, situated in the extreme northwestern part of the county. The strata exposed in this area have a stratigraphic range of 520 feet, most of them being above the Fire Clay coal. On the lower part of the creek near where the county line crosses, the strata rise rapidly toward the axis of the Caney anticline and hence the lowest rocks on the creek are brought above drainage. From the axis of this anticline which passes about ½ mile north of the county line, the strata dip south 30° east toward the Grape Creek syncline. This gives a rise of the strata in going downstream and a decided dip from the right to the left side of the creek. From a point about one mile below Lykins postoffice the strata are nearly horizontal on to the head of the stream. Details of the structure can better be seen by a study of the structure contour map which accompanies this report.

All the coals found between the Flag coal and the Fire Clay coal are present on Whiteoak creek, but those below the latter coal are very poorly developed.

The massive High Rock and Puncheon Creek sandstones are seen forming beautiful cliffs on tops of the ridges near the head of the creek, and the Flag coal should be present, although no openings into it were found. This coal is high in the hills or removed entirely on the lower part of the stream, and would not have much area except near the head of the creek.

The Hazard coal is opened in a number of places on the right side of the creek. The openings showed it to be cannel coal and to vary from 15 to 32 inches in thickness. This bed is no doubt cannel coal throughout the ridge between the right and left forks of Whiteoak creek and in the ridge between Whiteoak and Grape creeks as far up as Lykins postoffice, but above this point it is believed to be bituminous coal. The coal occurs 50 feet above a broad bench, and 200 to 220 feet above the Fire Clay coal.

A coal bloom at the horizon of the Whittaker coal was found at several places, but no openings or exposures were found where its thickness could be measured. It is probably a thin coal.

Only the bloom and one caved opening into the Young coal were seen. This coal would have a large area toward the head of the creek and should be prospected as it has a good thickness on the State Road fork of Johnson creek just over the ridge.

Between the Young coal and the Fossil limestone, two thin coal blooms were seen in one place, but they are not persistent over much area, the interval being mostly massive sandstone on this creek. The Haddix coal is poorly developed wherever seen on the creek. It is represented by only a thin coal occuring in the blue shale coming below the Fossil limestone, where that is present, otherwise below the massive sandstone.

About halfway between the Fire Clay and Haddix coals, the Hamlin coal, worked locally on Grape creek and showing a black shale roof, is also found on Whiteoak creek. It, however, is less than 15 inches thick wherever seen. The interval from this coal to the Fire Clay coal is massive sandstone in places and again shales containing one or two thin coals which correspond to the Fire Clay Rider.

The Fire Clay coal is found above drainage for almost the entire length of the creek, going below drainage about ½ mile from its head. On the lower part of the creek the bed is of a workable thickness and low in the hills, but toward the head of the stream it is poorly developed, being less than 20 inches in thickness. Two thin coals, neither over 20 inches thick are found 20 and 40 feet below the Fire Clay coal. Black slate was found above the upper one in one place. The interval from it to the Fire Clay coal is unusually small, nevertheless this coal is believed to be an upper split of the Whitesburg coal.

The Gun Creek coal is thin and unimportant on Whiteoak creek. It is above drainage on the lower mile and a half of the stream where the Caney anticline brings it up. The Cooper coal, also a thin coal less than 15 inches in thickness, if of no importance; at least this is the case where it is above drainage.

A detailed description of the openings and exposures of the coals on the creek follows. In discussing this creek, distances are measured from the point where the county line crosses it.

One-fourth of a mile up Whiteoak creek, up the second left branch, the following section was made along the road to the top of the hill:

Section

		Feet
Top of ridge	Elevation	1084
Massive sandstone		20
Covered		63
Shale		8
Bloom of fire clay rider	Elevation	1001
Shaly sandstone		20
Bloom of fire clay coal	Elevation	981
Shaly sandstone		17
Six-inch coal bloom	Elevation	964
Partly covered and shaly sandstone		90
Creek at mouth of the branch	Elevation	834

On the right, at the mouth of the first right branch, ¼ mile up the creek, a 12-inch seam of coal, the Tom Cooper coal, shows at a natural exposure. Eleveation 856. On the left at the mouth of this branch, is a caved opening into the Fire Clay coal at elevation 977. The coal was reported to be 36 inches thick.

Up a left drain ½ mile up the second right branch, which is ⅞ of a mile up Whiteoak creek, a partly caved wet opening into the Fire Clay coal on Ed Howard's place, shows:

Fire Clay Coal

	Feet	*Inches*
Dark gray shale	10	
Splint coal		18+
Elevation	986	

Flint fire clay was found on the dump.

A section to the head of this second right branch shows:

Section

		Feet
Top of ridge in road	Elevation	1095
Covered		5
Bloom of the fire clay coal	Elevation	1090
Gray shale		35
Bloom of the Whitesburg coal	Elevation	1055
Covered		25
Foot of hill 44 feet above opening into the fire clay coal	Elevation	1030

This shows a rise of 104 feet in the elevation of the Fire Clay coal in ¾ mile.

In the bed of the creek halfway between the first and second right branches is the Tom Cooper coal 8 inches thick at elevation 838.

On the right, ⅜ mile up the third left branch, which is ⅞ of a mile up Whiteoak creek, Mrs. Whitt had a prospect into the Fire Clay coal, elevation 947, now caved. One hundred yards farther up the branch and 27 feet below the Fire Clay coal, the Whitesburg shows:

Whitesburg Coal

	Feet	*Inches*
Shale	10	
Black shale		3
Cannel coal		2
Splint coal		10
Fire clay		1
Elevation	920	

In a left drain 200 yards above the mouth of the third right branch, Will Whitt has an opening into the Fire Clay which shows:

Fire Clay Coal

	Feet	*Inches*
Gray shale	10	
Coal		25
Flint fire clay		3
Coal		2½
Fire clay floor		
Elevation	946	

Just across the creek from the above opening, Will Whitt has another opening, now partly caved and filled with water, showing:

	Feet	*Inches*
Gray shale	15	
Coal		18+
Water		
Elevation	956	

Up a left drain ⅛ mile up the third right branch, which is one mile up Whiteoak creek, Ballard Whitt has an opening into the Fire Clay coal.

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	8	
Coal		24
Flint fire clay		4½
Coal		8
Shale floor		
Elevation	952	

A section up this branch shows:

Section

		Feet
Top of the ridge in the road	Elevation	1212
Covered		35
Good broad bench	Elevation	1177
Covered		110
Blue shale under massive sandstone		
Position of the Haddix coal	Elevation	1067
Shale, partly covered		25
Six-inch coal bloom, Hamlin coal (?)	Elevation	1042
Covered		5
Massive sandstone with shaly sandstone interbedded		50

Opening into the Fire Clay coal ½ mile up the branch on the right, on Gibson Holliday's place.

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Coal		24
Flint fire clay		4
Coal under water (?)		
Elevation	987	
Covered	10	
Shaly sandstone	5	
Thirteen-inch coal, Whitesburg coal (?)—Elevation	972	
Massive sandstone	8	
Shale and shaly sandstone	79	

Gun Creek Coal

	Feet	Inches
Coal		4
Shale		4
Coal		3
Shale		2
Coal		2
Elevation	863	
Blue shale	6	
Covered	12	
Mouth of stream—Elevation	845	

A section up the fourth left branch, 1⅝ miles up Whiteoak creek, is as follows:

Section

		Feet
Top of hill in the road	Elevation	1135
Covered		15
Good bench, place of the Hazard coal	Elevation	1120
Covered		47
Massive sandstone		25
Coal bloom, Young coal (?)	Elevation	1048
Shale		25
Massive sandstone		53
Bluish black shale with coal bloom, Hamlin coal		10
Shaly sandstone		10
Coal bloom—Fire clay rider	Elevation	940
Shale		20
Bloom of the fire clay coal	Elevation	920
Sandstone		5
Eight-inch coal, low split of fire clay coal	Elevation	915
Shale		15
20-inch coal, upper split of Whitesburg (?)	Elevation	900
Covered		50
Stream level at mouth of branch	Elevation	850

The Haddix coal is missing altogether here.

A section up the fifth left branch, 1¾ miles up Whiteoak creek is as follows:

Section

		Feet
Caved opening into the fire clay coal on W. F. Allen's place, reported to be 3 feet thick	Elevation	933
Covered		22
Shale		3
12-inch coal, Whitesburg coal (?)	Elevation	908
Covered		10
Massive sandstone		32
Shale		10

Gun Creek Coal

		Feet	Inches
Gun Creek coal	Elevation	856	
Shale			
Coal			2
Light gray shale			14
Coal			4
Shale		3	
Creek level at mouth of the stream	Elevation	853	

A section up the fourth right branch, 1¾ miles up Whiteoak creeks, shows several coals, as follows:

Section

		Feet
Top of ridge at head of stream	Elevation	1140
Covered		5
Sandstone		30
Slight coal stain, Young coal	Elevation	1105
Covered		20
Massive sandstone		60
Foot of hill at head of branch, covered		65
Opening into the fire clay coal, on the right, ½ mile up the branch	Elevation	960

Fire Clay Coal

		Feet	*Inches*
Shale		3	
Coal			24
Flint fire clay			3
Coal			2+
Water in the entry			
Elevation		960	
Covered		5	
Massive sandstone		10	
14-inch coal, Whitesburg coal	Elevation	945	
Covered		47	
Sandstone		10	
Blue shale		20	
Gun Creek coal: Coal 4″ Shale 14″ Coal 2″	Elevation	868	
Covered		10	
Creek level at mouth of the branch	Elevation	858	

The following section made up the fifth right branch, 2¼ miles up Whiteoak creek, shows the Whitesburg, Fire Clay and Hazard coals.

Section

		Feet
Top of the ridge in the road	Elevation	1207
Covered		35
Hazard coal, open up a left drain at the head of the branch by Joe Allen. Opening covered, but cannel coal on the dump. The bed section was reported to vary from 19 to 36 inches of cannel coal	Elevation	1172
Covered		172
Shale		5
Black, fissile, slaty shale		2
Seven-inch coal—Hamlin coal (?)	Elevation	993
Shaly sandstone		7
Covered		19
Prospect into the Fire Clay coal five-eighths mile up on the right	Elevation	957

Fire Clay Coal

	Feet	Inches
Gray shale	10	
Coal		32
Flint fire clay		3
Coal		3
Clay floor		
Elevation	957	
Covered	16	
Sandstone	4	

Sixteen-inch coal exposed 200 yards below the opening into the Fire Clay coal. This is the Whitesburg coal:

	Feet
Elevation	937
Sandstone, partly covered	73
Mouth of the branch Elevation	864

One-eighth mile up the sixth left branch, 2⅜ miles up Whiteoak creek, Lige Allen has the Fire Clay coal opened in several places. All but one was caved when visited. The bed section is:

Fire Clay Coal

	Feet	Inches
Gray shale	6	
Coal		32
Flint fire clay		4
Coal		2+
Elevation	925	

There is not over 3 to 4 inches of coal below the flint parting, which was not taken up in driving the entry.

One hundred yards farther up the branch Jim Allen has two openings into the same coal, the bed sections of which are:

Fire Clay Coal

	Feet	Inches
Gray shale	10	
Coal		25
Flint fire clay		3
Coal		4
Shale floor		
Elevation	925	

A section above these openings, along the road to the top of the hill, shows:

Section

	Feet
Base of High Rock sandstone cliffs.... Elevation	1235
Covered	95
Cannel coal bloom, Hazard coal.... Elevation	1135
Covered	50
Good bench and coal bloom—Young coal (?)... Elevation	1085
Covered	75
Thick-bedded sandstone	40
Bloom of the Haddix coal. One foot of purple shale above.... Elevation	970
Gray shale	23
Coal bloom with black shale above—Hamlin coal, Elevation	947
Shale	22
Fire Clay coal.... Elevation	925
Sandstone	20
Foot of hill.... Elevation	905

In the head of the seventh right branch, 2⅞ miles up Whiteoak creek, the Hazard coal, opened but partly covered when visited, showed the following bed section.

Hazard Coal

	Feet	Inches
Soil		
Gray shale		8
Cannel coal		8+
Cannel coal, reported		28
Elevation	1150	

Below in the bed of the branch is the Hamlin coal at elevation 967. A section at the mouth of the branch shows:

Section

	Feet
Covered	942 to 967
Massive sandstone	10
Twenty-one inches of coal, Whitesburg coal (?) Elevation	932
Covered	55
Mouth of the branch.... Elevation	877

The following section made on the eighth left branch, 3¼ miles up Whiteoak creek, shows the coals seen on that branch.

Section

	Feet	Inches
Base of the High Rock sandstone cliffs. Elevation	1238	
Covered	30	
Massive sandstone	60	
Bloom of the Hazard coal		
Covered	15	
Massive sandstone	20	
Covered	17	
Coal bloom, Whittaker coal (?) ....Elevation	1096	
Covered	23	
Coal bloom, Young coal ....Elevation	1073	
Massive sandstone	23	
Covered	17	
Massive sandstone	25	
Covered	15	
8-inch coal bloom, Haddix coal ....Elevation	993	
Massive sandstone	30	
Blue and purple shales	7	
Shale	3	
6-inch coal bloom ....Elevation	953	
Massive sandstone	14	
Black shale	1	
12-inch coal, Hamlin coal ....Elevation	938	
Sandstone	3	
Covered	4	
Shale	15	
Fire Clay coal { Coal ....10" Flint fire clay 3" Coal .... 4" } ..Elevation	916	
Sandstone	8	
Massive sandstone	10	
10-inch coal, Whitesburg coal (?) .....Elevation	898	
Light-gray shale	10	
Black slate		6
Gray shale	10	
Sandstone with small ferruginous concretions	5	
Creek level at the mouth of the branch..Elevation	883	

In the head of the eighth right branch, 3¼ miles up Whiteoak creek, the Hazard coal, opened on John F. Collingsworth's place, has the following bed section:

Hazard Coal

	Feet	Inches
Gray shale	5	
Black shale	3	
Black cannel coal		28
Shale floor		
Elevation	1135	

Eighty-five feet above this opening is the base of the High Rock sandstone cliffs.

Another entry into the same coal up the left fork of this branch, shows:

Hazard Coal

	Feet	Inches
Sandstone	2	
Block cannel coal		14–32
Shale floor		

The roof of this opening is very irregular, the coal evidently having been partly eroded before the deposition of the overlying sandstone.

On the right at the mouth of the ninth right branch, 3⅝ miles up Whiteoak creek, the Fire Clay coal and an upper split of the Whitesburg coal are shown in the following section:

Fire Clay Coal

	Feet	Inches
Soil		
Coal		17
Flint fire clay		3
Coal		1
Elevation	923	
Shale	20	
Coal ....Whitesburg (?)		8

The Fire Clay coal goes under drainage up the branch at elevation 925, and the Fire Clay Rider one-fourth of a mile farther up, at elevation 978, with 20 feet of massive sandstone showing above it. In the head of this branch, the Hazard coal is being mined by tunnel through the hill from the right fork of Whiteoak creek. Four openings into the coal show the following bed sections:

Hazard Coal

	Feet	Inches
Massive sandstone	5′	
Gray shale		12–36
Black cannel coal		19–36
Shale floor		

The roof of this coal is very uneven, due to the same cause as that stated above.

The High Rock sandstone cliffs are beautifully developed at the head of this branch; the base of them is here 110 feet above the coal openings.

On the right, opposite the mouth of the tenth left branch, 4 miles up Whiteoak creek, the Fire Clay coal shows the following section at a natural exposure:

Fire Clay Coal

	Feet	Inches
Sandstone	4	
Shale		18
Coal		15
Flint fire clay		4
Elevation	930	

On the right, at the mouth of a right branch 4 miles up Whiteoak creek, the Fire Clay coal shows 12 inches of coal and 3½ inches of flint fire clay at a natural exposure.

Up a right drain, ⅜ mile up this right branch, James F. Coffee has prospected the Hazard coal by stripping. Its bed section here is:

Hazard Coal

	Feet	Inches
Soil	3	
Black shale	3	
Cannel coal		15
Elevation	1136	

In the head of a right branch of this branch, ½ mile up, Ed Lykins has opened the same coal. Its bed section is:

Hazard Coal

	Feet	Inches
Soil	3	
Black bituminous shale	3	
Block cannel coal		19
Elevation	1141	

On the right of the road at the head of the branch, another opening shows:

Hazard Coal

	Feet	Inches
Soil	3	
Black shale	3	
Block cannel coal		19
Shale floor		
Elevation	1131	

A section up the twelfth left branch 4½ miles up Whiteoak creek is as follows:

Section

	Feet	Inches
Top of the hill........................Elevation	1174	
Covered	66	
Coal bloom, Whittaker coal..........Elevation	1108	
Covered	29	
Strong coal bloom, Young coal........Elevation	1079	
Covered	49	
8-inch coal bloom...................Elevation	1030	
Covered	10	
Coal........ { Coal ...... 8" Shale .....10" Coal ...... 6" } Trace Fork coal		
Massive sandstone............................	28	
Blue shale......................................	2	
Hard blue fossiliferous limestone...............	1	
Blue fossiliferous shale.......................	2	
Dark-gray, impure limestone containing fragments of crinoids...........................		6
Blue shale......................................	12	
Bloom of Haddix coal...............Elevation	986	
Blue shale......................................	18	
Massive sandstone............................	14	
13-inch coal, Hamlin coal............Elevation	954	
Arenaceous shale..............................	16	
6-inch coal bloom, Fire Clay rider.....Elevation	938	
Shale	6	
Fire Clay coal { Coal ....10" Flint fire clay.. 2" } Elevation	932	
Sandstone	8	
10-inch coal in the bed of the branch at its mouth. Elevation	924	

The Young and Hazard coals are both opened just over the ridge on the State Road fork of Johnson creek.

On the right, at the mouth of this branch, Tom J. Lykins has a caved opening into the Young coal at elevation 1075. Its section as he reported it is:

Young Coal

	Feet	Inches
Massive sandstone............................	10	
Coal		12
Shale		4
Coal		20
Elevation	1075	

On up the main creek ½ mile, the Fire Clay coal goes under drainage at elevation 946. It shows 10 inches of coal and 4 inches flint fire clay parting. A section at the head of the creek shows:

Section

		Feet
Top of ridge	Elevation	1380
Covered		80
High Rock sandstone		60
Covered		215
Massive sandstone		40
Blue shale		5
Covered		22
6-inch coal	Elevation	958
Covered		12
Fire Clay coal	Elevation	946

LICKING RIVER AND TRIBUTARY BRANCHES

FROM THE COUNTY LINE TO LICK CREEK ON THE LEFT AND TO JOHNSON CREEK ON THE RIGHT

The area drained by these streams is approximately 12 square miles. The principal streams are Grape creek, 7½ miles below Salyersville; Harper branch, ½ mile below Grape creek; Trace branch, 2 miles below Grape creek; Ben branch and Pricy creek, 1½ and ½ miles, respectively, from the county line where it crosses Licking river.

The strata exposed in this area range from a thin coal, probably the Lacey Creek coal, 223 feet below the Fire Clay coal, to the High Rock sandstone above the Flag coal. The lowest are exposed ¼ mile below the mouth of Pricy creek where the river cuts across the Caney anticline.

The structure of the strata of this area is a synclinal basin and an anticline. From the crest of the Caney anticline, crossing Licking river ¼ mile below Pricy creek and running 10° to the north of east, the strata dip in a direction south 10° east to the Grape Creek syncline, the center of which is at and just below the mouth of Grape creek. For detailed structure on each tributary reference is made to the structure contour map accompanying this report.

No continuous workable coals were found opened or exposed in this area. All of the coals from the Flag to the Cooper coal are present but, wherever seen, were generally thin. The Flag coal, 30 to 35 feet below the massive High Rock sandstone forming prominent cliffs on Grape creek, was not opened or exposed where a measurement of its bed section could be made. Three openings into the Hazard coal showed it with a thickness of less than 30 inches. Several coal blooms were found at different places just below the horizon of this coal and it is likely that the coal is split into two or more beds. However, it is high in the hills wherever present at all and there would be only a comparatively small area of the coal.

Only the blooms of the Whittaker and Young coals were seen. Several coal blooms were found at the horizon of the Young coal. Just which one of these is the main bed is impossible to say with any degree of certainty, as no openings into the coal were found. The Haddix coal shows a variable thickness; but averages 33 inches of excellent coal in the ridge between Johnson and Grape creeks, for a distance of one mile up on the Grape creek side, and still better on the Johnson creek side. However, toward the head of Grape creek it is poorly developed and of no commercial value. The thickness and extent of this coal in this area is uncertain as the coal was eroded in places before the deposition of the overlying strata. The coal is low enough in the hills on Grape creek and for some distance downstream to give it a good area.

The Hamlin coal is worked for local use toward the head of Grape creek, but has a thickness of only 18 inches. In the ridge between Whiteoak creek, Grape creek and Licking river the Fire Clay coal runs from 22 to 37 inches in thickness. On Ben branch and Pricy creek it is represented by a cannel coal without the flint parting, the cannel coal seam being an upper split of the main bed or one which carries the flint Fire Clay. The latter together with the Whitesburg coal are cut out over the territory below Trace branch, on Ben branch, and on part of Pricy creek by a massive, white, fine-grained sandstone which replaces the gray shales and shaly sandstone of the Grape Creek area.

The Gun Creek and Cooper coals are worked for local use in places, but do not show over 24 inches of coal. The Gun Creek coal is part cannel below the mouth of Pricy creek. A massive sandstone, 50 feet thick, coming just beneath the Cooper coal, is brought above drainage by the Caney anticline ⅛ mile below Pricy creek, where 15 feet of blue shales with a thin 2-inch coal, probably the Lacey Creek coal, are exposed beneath it.

One-half mile below the mouth of Pricy creek the Gun Creek coal was opened on the right by Boone Brown at elevation 944.

Gun Creek Coal

	Feet	*Inches*
Sandstone	4	
Coal		2
Shale		5
Coal		2½
Shale		12
Cannel coal		12
Shale floor		
Elevation	944	

This opening is very close to the crest of the anticline.

PRICY CREEK

Up a left drain ⅜ mile up Pricy creek the Tom Cooper coal, opened by Oscar Lykins back of his house, shows:

Tom Cooper Coal

	Feet	*Inches*
Shale	4	
Black shale	20	
Coal		24
Shale floor		
Elevation	860	

On the left of a left drain, ⅜ mile up the first right branch of Pricy creek, on Will Lykins' place, a facing into the Fire Clay coal shows:

Fire Clay Coal

	Feet	*Inches*
Soil		
Shale	..	
Black bituminous shale		18
Cannel coal		21
Clay floor		
Elevation	1010	

One-half mile up the first right branch of Pricy creek, at the mouth of a right drain where the road goes over to the river, the Cooper coal shows:

Tom Cooper Coal

		Feet
Black shale		2
Coal, 10 inches	Elevation	854
Shale		3
Sandstone		3
Creek level		

The bloom of the Gun Creek coal shows in the road up the hill at the head of this drain at elevation 889, under massive sandstone.

One and one-eighth miles up Pricy creek the Cooper coal was dug from the creek at elevation 828. There is a strong dip to the northwest at this point.

One and three-eighths miles up Pricy creek, up a left drain, the Fire Clay coal is opened at elevation 950.

Fire Clay Coal

	Feet	*Inches*
Sandstone	3	
Black bituminous shale		6
Cannel coal		18
Water		
Elevation	950	

Section on down to Creek

		Feet
Covered		10
Massive sandstone		30
6-inch coal, Whitesburg coal	Elevation	910
Covered		5
Sandstone		5
Covered		62
Stream level	Elevation	838

The thin coal at elevation 910 is probably the representative of the Whitesburg coal.

On up the creek for 1⅝ miles the massive sandstone below the Fire Clay coal is exposed in the branch. There is a strong dip to the northwest along this part of the stream noticeable in the benches on the hills.

One-eighth mile below the road, over the ridge to Rockhouse creek, Preston Triplett had a digging into a coal bloom on the right at elevation 1040, 140 feet above the creek. Solid coal was not reached. It is near the horizon of the Young coal. Beneath this and 20 feet above the stream is a thin 4-inch coal, which is near the horizon of the Fire Clay Rider.

A section up the road and drain, and over the ridge into Rockhouse creek shows:

Section

		Feet
Top of hill	Elevation	1075
Coal bloom—probably the Young coal	Elevation	1041
Massive sandstone		35
Shale		5
Covered		45
Arenaceous shale		8
Old digging into a coal, Haddix coal (?)	Elevation	956
Covered		15
Coal bloom	Elevation	941
Massive sandstone		40
Thin coal	Elevation	901
Sandstone		5
Creek level	Elevation	896

The coal at 956 is probably the Haddix coal; the one at the bottom of the section is the same as that 20 feet above the stream 1/8 mile below.

A section up the left fork of Pricy creek shows:

Section

			Feet
Base massive Puncheon Creek sandstone		Elevation	1300
Top of the ridge in the road		Elevation	1232
Covered			35
Massive sandstone			30
Covered			5
Massive sandstone			20
Coal bloom—low split of Young coal (?)		Elevation	1140
Covered			135
7-inch coal, Fire Clay coal		Elevation	1005
Shale and shaly sandstone			35
Whitesburg coal	Gray shale Black shale.... 2′ Coal ....12″	Elevation	972
Massive sandstone			35
Fork of the creek		Elevation	937

A section up the right fork of Pricy creek shows:

Section

		Feet
Top of ridge	Elevation	1232
Covered		53
Coal bloom, Whittaker coal (?)	Elevation	1179
Covered		40
Coal bloom, Young coal	Elevation	1139
Covered		50
Massive sandstone		55
Covered		65
Shale		5
30-inch coal bloom, Whitesburg coal	Elevation	972
Covered		5
Massive sandstone		30
Forks of Pricy creek	Elevation	937

One and one-fourth miles above the mouth of Pricy creek, on the left, the following section shows three coals:

Section

				Feet
Fire Clay coal	Cannel coal float in the soil		Elevation	1004
	Covered			10
	Flint fire clay in the soil		Elevation	994
Covered				5
Massive, fine-grained, white sandstone				10
Shale				5
Gun Creek coal	Coal	3"	Elevation	886
	Gray shale	5"		
	Coal	2½"		
	Shale	3"		
	Coal	8"		
Gray shale				37
Bloom of the Cooper coal			Elevation	849
Massive sandstone—covered in part				65
River level			Elevation	784

On the point, on the left of the river and just below the mouth of Ben branch, W. S. Brown has an opening into the upper split of the Fire Clay coal. Its bed section is:

Fire Clay Coal (Upper Split)

	Feet	Inches
Sandstone	2	
Coal		6
Gray shale	5	
Black shale		8
Black bituminous shale		12
Coal		6
Shale floor		
Elevation	980	

A section below this opening shows:

Section

		Feet
Covered		10
Massive sandstone		80
Covered		10
Bloom of the Gun Creek coal	Elevation	875
Covered		30
Bloom of Cooper coal	Elevation	845
Massive sandstone		65
River level	Elevation	780

BEN BRANCH

Elevation of mouth, 785.
A section up Ben branch shows:

Section

		Feet
Top of ridge at head of stream	Elevation	1232
Covered		5
Massive sandstone		35
Coal bloom, Hazard coal (?)	Elevation	1194
Covered		33
Coal bloom, Whittaker coal	Elevation	1161
Covered		12
Coal bloom	Elevation	1149
Covered		25
Coal bloom, Young coal	Elevation	1124
Shale		5
Massive sandstone		70
Blue shale		5
Dark bluish-black shale—place of Haddix coal		1
Blue shale		5
Covered		17
Blue shale		3
Shaly sandstone		5
Massive sandstone		25
Five feet of sandstone with coal cross-bedded in it (The place of the upper split of the Fire Clay coal, opened in two places on the creek given below)	Elevation	993

Three-fourths mile up the branch, in a left drain, an opening by Oscar Lykins shows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Gray shale	4	
Black bituminous shale		18
Cannel coal		13
Shale floor		
Elevation	984	

One mile up the branch, in a right drain, the Fire Clay coal was opened by J. F. Brown.

Fire Clay Coal

	Feet	Inches
Massive sandstone	4	
Gray shale		12
Black bituminous shale		8
Cannel coal		12
Cannel coal, reported		12
Elevation	976	

Section (continued)

		Feet
Massive sandstone		108
10-inch coal, Gun Creek coal	Elevation	885
Covered		31
Shale		10
8-inch coal—bloom Tom Cooper coal	Elevation	845
Shale		5
Massive sandstone		55
River level at mouth of creek	Elevation	785

One-fourth of a mile above Ben branch, on the left of the river, the following section gives the Gun Creek and Cooper coals:

Section

			Feet
Calcareous sandstone			10
Covered			8
Shaly sandstone			5
Gun Creek coal	Coal 7½" Hard fire clay ¼" Black shale 3" Coal 3½"	Elevation	864
Bluish arenaceous shale			6
Covered			19
Gray arenaceous shale			10
8-inch coal bloom, Cooper coal		Elevation	829
Massive sandstone			43
River level		Elevation	786

On the right at the mouth of Lick creek, up a little drain, the Cooper coal is in the bed of the branch at elevation 820. Its section could not be measured.

A section up the second right branch of Licking river in Magoffin county (Cooper branch) shows the following coals:

Section

	Feet
Covered from top of the hill to 10-inch coal bloom—Fire Clay rider . . . . Elevation	994
Shaly sandstone	8
Fire Clay coal . . Coal 10" Flint fire clay 3" Coal 8" . . Elevation	986
Sandstone	3
8-inch coal bloom . . . . Elevation	983
Shaly sandstone	24
7-inch black bituminous shale . . . . Elevation	959
Shaly sandstone	4
Thick-bedded sandstone	11
Clay shale	3
Thin-bedded sandstone	7
Bastard limestone concretions	2
Covered (probably shale)	50
9-inch coal bloom . . . . Elevation	884
Shaly sandstone	40
Covered	25
9½-inch coal bloom—Tom Cooper coal . . . . Elevation	819
Massive sandstone	27
River level . . . . Elevation	792

TRACE BRANCH

A section up Trace branch shows:

Section

	Feet
Top of knob on right of road at the top of the hill. Elevation	1290
Covered	30
Coal bloom—probably Young coal . . . . Elevation	1260
Massive sandstone	45
Top of hill in the road . . . . Elevation	1163
Covered	20
Massive sandstone	25
Coal bloom, Fire Clay rider . . . . Elevation	1118
Shaly sandstone	25
5-inch coal bloom . . . . Elevation	1093
Sandstone	8
Fire Clay coal . . Coal 4" Flint fire clay 3" Coal 3" . . . Elevation	1085
Shaly sandstone	13
12-inch coal . . . . Elevation	1073
Sandstone	10
Shaly sandstone	5
10-inch coal bloom, Gun Creek coal . . . . Elevation	1058
Covered	70
Foot of hill at head of the stream: Coal bloom, Tom Cooper coal . . . . Elevation	988

This coal remains about at stream level to near the mouth of the stream, where it is seen 200 yards up on the right and shows 11 inches coal at elevation 813. From this exposure to the mouth of the branch it is covered. Elevation of mouth, 794 feet A. T.

On the point ½ mile above Trace branch is the following section:

Section

				Feet
Massive sandstone				30+
Fire Clay rider	Coal	8"	Elevation	984
	Shale	1½"		
	Coal	6"		
Covered, flint fire clay in soil				50
Whitesburg coal	Coal	10"	Elevation	934
	Shale	8"		
	Coal	3"		
Covered massive sandstone showing in place				70
Gun Creek coal	Coal	3"	Elevation	864
	Fire clay	3"		
	Coal	2½"		
	Shale	4"		
	Coal	2"		
Covered				68
River level			Elevation	796

In a little branch, 1 mile due north of the mouth of Harper branch, the Fire Clay coal is opened by Homer Whitt.

Fire Clay Coal

	Feet	Inches
Shale	10	
Block coal		27½
Flint fire clay		4
Coal		10½
Clay floor		
Elevation	926	

One-half mile up the river from the above point, on the left, is an exposure of the Gun Creek coal in a drain:

Gun Creek Coal

	Feet	Inches
Sandstone	4	
Soil	3	
Coal		2
Shale		2
Coal		2½
Shale	2½	
Coal		12
Fire clay below		
Elevation	820	

One-fourth mile below Harper branch, on the right of the river, the Fire Clay coal, opened by Whitt Harper, shows:

Fire Clay Coal

	Feet	Inches
Sandstone	4	
Shale	15	
Splint coal		22½
Flint fire clay		4
Block coal		7
Shale floor		
Elevation	907	

Sixty-three feet above this opening, on top of a point, a coal reported to have been dug into and as showing 2+ feet of cannel coal, is the Haddix coal.

HARPER BRANCH

Elevation of mouth, 803.

One-half mile up Harper branch and ¼ mile up a right branch the Fire Clay coal is opened up by Will Amyx and shows:

Fire Clay Coal

	Feet	Inches
Soil		
Splint coal		26½
Flint fire clay		4½
Coal		7
Shale floor		
Elevation	911	

A section on the left, ½ mile up Harper branch, shows:

Section

		Feet
Top of hill	Elevation	1130
Covered		30
Massive sandstone		20
Covered		10
Sandstone		25
Covered		40
Massive sandstone		23
Covered		10
1 foot hard, blue fossiliferous limestone—Fossil limestone	Elevation	967
Covered		17
4-inch coal, Haddix coal	Elevation	950
Shale		3
Sandstone		4
12-inch coal, 2 inches black shale above—Hamlin coal...	Elevation	943
Shaly sandstone		32
Bloom of Fire Clay coal	Elevation	911
Shaly sandstone		10
8-inch coal bloom	Elevation	901
Shaly sandstone		13
12-inch coal bloom	Elevation	888
Shale and shaly sandstone		32
Creek bed	Elevation	856

The seam at elevation 888 probably represents the Whitesburg coal; otherwise it is missing here.

In the head of Harper branch a coal at elevation 930 shows 14 inches coal with 2 feet black shale above. This is the Hamlin coal.

A section up the hill, out of the head of Harper branch, shows:

Section

		Feet
Top of hill	Elevation	1135
Covered		32
Entry into Hazard coal on the right of the road.	Elevation	1103

Hazard Coal

	Feet	Inches
Shale	15	
Coal		18+
Water and mud ..... Elevation	1103	
Covered	18	
Massive sandstone	40	
Covered	85	
18-inch hard blue fossiliferous limestone—Fossil limestone ..... Elevation	960	
Covered	20	
Gray shale	10	
Black shale	2	
Hamlin coal ..... Elevation	930	

One fourth mile above Harper branch, on the right of the river, up a little drain, the Fire Clay coal, opened by Shilo Lykins, shows:

Fire Clay Coal

	Feet	Inches
Gray shale	10	
Splint coal		22½
Flint fire clay		4
Coal		4
Shale floor		
Elevation	905	

GRAPE CREEK

Elevation of mouth, 804.

Two hundred yards up the creek, up a right drain, the Haddix coal was opened by Ester Patrick, at elevation 962. It is now completely covered, but reported to have shown 36 inches of "nearly cannel" coal.

Sixty feet below this opening the bloom of the Fire Clay coal is seen.

A section on the left at the mouth of Grape creek shows:

Section

	Feet	Inches
Gray, arenaceous shale	4	
Bloom Fire Clay coal { Coal bloom...12" Flint fire clay 3" Coal bloom...12" } Ele.	900	
Gray arenaceous shale	17	
Black slaty shale		4
Gray shale	3	
11-inch coal bloom—low split of Fire Clay coal, Elevation	880	
Bluish-gray shale with flat calcareous concretions	70	
Covered	6	
Elevation of river at mouth of creek	804	

The Whitesburg coal is seen to be missing here.

In the head of a right branch, ½ mile up the creek, the Fire Clay coal is opened on the right by Allen Lykins and shows:

Fire Clay Coal

	Feet	Inches
Shale	10	
Splint coal		18
Flint fire clay		3
Coal		4
Shale floor		
Elevation	915	

The Haddix coal is opened in a left branch ¾ mile up the creek in three places by Edward Lykins and shows:

NO. 1—ON LEFT

Haddix Coal

	Feet	Inches
Massive sandstone	4	
Splint coal		30
Shale floor		
Elevation	985	

NO. 2—ON LEFT, 200 FEET UP

Haddix Coal

	Feet	Inches
Massive sandstone	5	
Soft, gray shale		18
Splint coal		31
Shale floor		
Elevation	985	

NO. 3—ON RIGHT, OPPOSITE NO. 2

Haddix Coal

	Feet	Inches
Massive sandstone	10	
Sandstone and coal		8
Splint coal		29
Shale floor		
Elevation	985	

These openings show the Haddix coal much thinner than on the other side (Johnson creek) of the ridge, where it is 48 inches thick. The massive sandstone roof over this coal is very uneven, almost cutting the coal out in places, and with light soft-gray shale between it and the coal in others, showing an unconformity due to the partial erosion of the coal previous to the deposition of the sandstone.

One and one-eighth miles up the creek, on the right of the mouth of a left branch, the Whitesburg coal, opened by Andy Lykins, shows:

Whitesburg Coal

	Feet	Inches
Dark-colored shale	5	
Coal		16
Fire-clay floor.......Elevation	880	
Stream level.......Elevation	835	

In the head of the left branch mentioned just above a prospect into the Haddix coal shows:

Haddix Coal

	Feet	Inches
Sandstone	1	
Coal		1
Fire clay		1
Coal		1
Fire-clay shale		16
Black clay		8
Fire-clay shale		24
Cannel coal		12
Elevation	995	

This shows how uncertain the Haddix coal is in this region.

One and one-eighth miles up the creek and up a right branch the Fire Clay coal taken from the bed of the creek by John Lykins shows:

Fire Clay Coal

	Feet	Inches
Shale	4	
Coal		8
Shale		1–1½
Coal		14
Flint fire clay		3
Coal		6
Shale		2
Coal		1½
Shale floor		
Elevation	915	

On the hillside, just above this opening, the Hamlin coal was dug into at elevation 933 and reported to show 18 inches of coal.

One and one-half miles up the creek, in the bed of it where a large right branch empties, is the Whitesburg coal 5 inches, or one of the thin seams into which it may be split, at elevation 855. Two hundred yards up this right branch is the bloom of the Fire Clay coal, on the right, at elevation 915. One-half mile up this branch, 150 yards above the forks, the Hamlin coal, taken from the branch at elevation 930, shows:

Hamlin Coal

	Feet	*Inches*
Shale	2	
Black shale		16
Coal		6
Shale		2
Coal		6½
Elevation	930	

A section up the left fork of this branch shows:

Section

	Feet	*Inches*
Cannel coal float in soil—Hazard coal. . Elevation	1135	
Covered	35	
Coal bloom, Hazard coal. . . . Elevation	1100	
Covered	14	
Coal bloom, Whittaker coal (?) . . . . Elevation	1086	
Covered	36	
Coal bloom, Young coal. . . . Elevation	1050	
Covered	70	
Covered	5	
Coal stain, Haddix coal. . . . Elevation	965	
Shale	15	
Coal bloom		4
Sandstone	10	
Gray shale	10	
Hamlin coal. . . . Elevation	930	

Two miles up Grape creek, at the mouth of a large right branch, is the following section:

Section

	Feet	*Inches*
Shale	8+	
12-inch coal, Fire Clay rider. . . . Elevation	925	
Shale	18	
Bluish-black shale	2	
Black bituminous shale	5	
Clay		2
Coal		6
Shale	2	
Fire Clay Coal { Coal . . . . 12″ Flint fire clay . . 5″ Coal . . . . 5″ } Elevation	910	

One-half mile up this branch, on the right up a small branch, the Hamlin coal dug from the branch shows:

Hamlin Coal

	Feet	Inches
Shale	4	
Black shale		18
Coal		8
Shale		2
Coal		8
Elevation	932	

Three-eights mile up this branch, on the right in a drain, is a caved opening into the Hazard coal at elevation 1130, reported to be 36 inches thick.

A section up the hill along the road, at the head of this branch, shows:

Section

		Feet
Top of hill	Elevation	1197
Coal bloom, Hazard coal	Elevation	1148
Covered		20
Massive sandstone		10
Coal bloom, Whittaker coal	Elevation	1118
Covered		11
Coal bloom, low split of Whittaker coal	Elevation	1107
Covered		57
Coal float in soil, Young coal	Elevation	1050
Massive sandstone		10
Covered		18
Massive sandstone		35
Coal bloom, Haddix coal (?)	Elevation	987
Covered		55
Hamlin coal	Elevation	932

From a point 2½ miles up Grape creek, a section up the stream to its head, shows:

Section

		Feet
Base of High Rock sandstone cliffs	Elevation	1231
Covered		40
Good coal bloom, Flag coal	Elevation	1191
Covered		5
Coal bloom	Elevation	1186
Covered		40
Covered prospect into the Hazard coal in the head of the creek	Elevation	1146

Caved prospect into the Hazard coal in the head of the creek. Elevation 1146.

Another opening, ½ mile from the head of the creek on John F. Rudd's place, shows:

Hazard Coal

	Feet	Inches
Sandstone	3	
Gray shale	2	
Coal		26+
Water in entry		
Elevation	1146	

Section (continued)

		Feet
Covered		26
Good bench	Elevation	1120
Covered		40
Coal bloom, Young coal	Elevation	1080
Covered		10
Massive sandstone		65
Blue shale—blocks of the Fossil limestone in the stream		5
3-inch coal	Elevation	1000
Shale		5
Haddix coal: Coal 6" Shale 4" Coal 3" Shale 4" Coal 4"	Elevation	995
Blue shale		5
Sandstone		22
Coal: Coal 6" Shale 7" Coal 8" — Upper split of Hamlin coal	Elevation	968
Gray shale		6
Black shale		2

Hamlin coal on the right, in front of John F. Rudd's house, ½ mile from the head of the creek.

Hamlin Coal

	Feet	Inches
Black shale	2	
Coal		7
Shale		2
Coal		8

This coal is opened for some distance along the creek for local use.

Section (continued)

		Feet
Covered		10
Shale		10
6-inch coal	Elevation	940
This coal dips down the stream as it falls, to elevation 927, where the dip reverses.		
6-inch coal, Fire Clay rider	Elevation	927
Gray shale		2
6-inch coal	Elevation	925
Gray shale		3
Fire Clay coal: Coal 9" Flint fire clay 3" Coal 1"	Elevation	922

JOHNSON CREEK

Elevation of mouth, 806.

Johnson creek joins Licking river, on the right, six miles below Saylersville. It drains an area of approximately 30 square miles. The principal tributaries to the stream are: Cow creek, 2⅝ miles up on the left; Long branch, 3¼ miles up on the right; Turkey branch, 4¾ miles up on the right; State Road fork, 5 miles up on the right, and the Right and Left forks, with Crane's Nest branch, ¼ mile up the Left fork on the right. Not all of the State Road fork lies in Magoffin, but only that part below the mouth of Wheelram fork, which is 2½ miles up the fork.

The strata on this creek are disturbed to rather an unusual degree. The Johnson creek fault, its general direction 10° to the north of east, enters the county ¼ mile north of the State Road fork at the mouth of Wheelram fork, and crosses the main creek one mile from its mouth. It is plainly seen on all the right branches of the State Road fork and the main creek. To the north of the fault, which is the upthrow side, the strata dip to the north, toward the Grape creek syncline, but to the south of it the structure is more uneven. From a line about two miles south, and parallel with the fault, the strata dip toward it, the dip becoming greater nearer the fault.

On the main creek from the mouth of State Road fork to the forks the strata rise rapidly, bringing the Fire Clay coal from an elevation of 800 feet to 1,000 feet A. T. (See structure contour map accompanying this report.)

About 700 feet of strata are above drainage on the creek, the lowest being above drainage at its mouth and the highest at the head of the left fork on the knob to the right of what is known as Town Flats, which is a flat-topped knob where the Breathitt, Wolfe and Magoffin county lines meet. The coals above the massive Puncheon Creek and High Rock sandstones were seen only as blooms along the road up to Town Flats at the head of the stream. The high cannel coal is apparently about an 18 to 24 inch bed of coal. The next coal, 20 feet below, showed as a thick coal bloom in the road, indicative of a coal at least 4 feet in thickness. This coal is probably the Hindman coal, judging by its interval to the Flag coal. This coal if present on any other part of the creek would be just under the tops of the highest knobs.

The Flag Coal Rider, found about 20 feet below the base of the Puncheon Creek-High Rock sandstones which form prominent cliffs on the tops of the ridges where they are high enough to catch it, was seen only as a coal bloom. A caved opening into it was reported to show 18 inches of coal.

The Flag coal, opened in several places, showed 28 to 30 inches of solid coal. It is high in the hills over about two-thirds of the area, and is about 50 feet below the base of the sandstone cliffs and 50 to 70 feet above the broad bench on which the Hazard coal is nearly always found. Between the Flag and Hazard coals two thin blooms were sometimes found. They are apparently not persistent, however.

The Hazard coal is the most promising of the coals seen on the creek. On the middle and lower part of the creek it is well up in the hills and shows only about 28 to 34 inches of coal where seen, but in the ridges at the head of the main creek it shows 32 and 52 inches of good coal. This coal deserves further investigation in this region.

The Whittaker coal was not exposed where a bed section could be made. Its bloom showed in a number of places and comes about half-way between the Hazard and Young coals. Only two openings into the Young coal were found, and these showed a thickness of 38 and 47 inches of coal. In the ridge between State Road fork and Whiteoak creek this coal should have a good workable thickness, but no openings or exposures were found at the head of the main creek and Cow creek. The strata in the interval between the Young and Hazard coals are predominantly sandstone, although thin coals and some shales are found in places. The same is true as to the interval between the Young coal and the Fossil limestone, except that thin coals and shale are more likely to be found in this interval.

The Trace Fork coal (?) was observed as only a bloom and a thin coal. It is of no commercial value.

The Fossil limestone is probably persistent over the greater part of the Johnson Creek area, as it was seen in a number of places.

From the mouth of the creek to Turkey branch the Haddix coal seems to be continuous and carry from 30 to 40 inches of excellent coal; however, this is uncertain, as on Grape creek this coal was partly removed by erosion before the deposition of the overlying strata. Toward the head of the main creek this coal is missing or poorly developed.

None of the remaining coals found on the creek have a workable thickness. The Whitesburg coal shows 24-inch coal in a number of places at the head of the main creek, but the other coals are not persistent over the whole area, except the Fire Clay coal and its rider. The interval between the Fire Clay Rider and remaining coals are shale over the entire area, with the exception of the Fire Clay-Whitesburg Coal interval, which is shaly sandstone in places.

A detailed description of the openings and exposures of the coals on the creek follows:

One-eighth mile up the creek, ¼ mile up the first left branch, a seam of the Whitesburg coal shows 10 inches of coal beneath arenaceous shales in the bed of the creek. Elevation, 880.

Five-eighths mile up the creek, up the first right drain, the Haddix coal, opened by LaFayette Wheeler, shows:

Haddix Coal

	Feet	*Inches*
Massive sandstone	5	
Gray shale	1	
Splint coal		25
Semi-cannel coal		24
Shale floor		
Elevation	990	

The gray shale is cut out and sandstone rests on the coal, which pinches down itself considerably, halfway in, and then thickens to 55-inch coal (29-inch semi--cannel) at the face of the entry, which is 20 yards back.

A section below this opening shows:

Section

			Feet
Haddix coal		Elevation	990
Covered			20
Massive sandstone			40
Fire Clay coal	Coal 8"	Elevation	930
	Shale 3"		
	Coal 9"		
	Flint fire clay 5"		
	Shale		
Shale and covered			50
7-inch coal, Whitesburg		Elevation	880
Covered			70
Creek level		Elevation	810

One and one-fourth miles up the creek, on the left, a thin coal 2 to 4 inches thick, at elevation 830, is probably the Tom Cooper coal. Twenty feet of the massive sandstone coming just below it is exposed by the creek 1 mile up at the mouth of the second left branch, where the Johnson Creek fault crosses. The sharp curve in the stream here is due to the effects of the fault.

Two and one-half miles up the creek, ¼ mile up the third right branch, on the right, is a caved opening into the Haddix coal at elevation 1002. A section below this opening shows:

Section

			Feet
Covered			72
Fire Clay Coal	Coal 10"	Elevation	930
	Flint fire clay 4"		
	Coal 11"		
	Black bituminous shale. 1"		
(Section continued to mouth of branch)			
Shaly sandstone			20
Sandstone			10
Massive sandstone			38
5-inch coal		Elevation	862
Covered			40
Mouth of branch		Elevation	822

The fault crosses this branch half way up, the 38 feet of sandstone and 5 inches of coal being on the down throw, or south side.

In the head of the branch discussed above, the Fire Clay Rider is opened and shows:

Fire Clay Rider

	Feet	Inches
Sandstone	2	
Gray shale		8
Coal		6
Gray shale		2
Coal		8
Elevation	952	

Two and one-fourth miles up, on the right, opposite the mouth of the third right branch, is an old caved opening into the Haddix coal, reported 3½ to 4 feet of coal, at elevation 952. Below this, 20 feet above the stream, is the bloom of the Whitesburg coal at 842.

COW CREEK

Tributary to Johnson creek, 2⅝ miles up. Elevation of mouth, 826.

On the left, at the mouth of Cow creek, the Whitesburg coal is exposed on the roadside at elevation 846. It shows 6-inch coal beneath 6 inches of black shale and 10 feet of gray shale.

One-half mile up Cow creek, on the right of the mouth of the second left branch, C. B. Reed opened two coals, one at elevation 951 and the other at 976. The upper one is the Haddix and the lower one probably a split of the same bed, or else the Hamlin coal.

One-eighth mile up this second left branch of Cow creek, up a left drain, C. B. Reed has an opening into the Fire Clay coal.

Fire Clay Coal

	Feet	Inches
Sandstone	5	
Coal		4
Black clay		4
Splint coal		14
Gray, arenaceous shale		26
Fire clay		2
Splint coal		12
Flint fire clay		4
Two to six inch coal in water		
Elevation	896	

A section down the hill along the road at the head of this branch shows:

Section

		Feet	*Inches*
Top of hill	Elevation	1204	
Covered		4	
Coal bloom, Flag coal	Elevation	1200	
Sandstone		26	
10-inch coal bloom	Elevation	1174	
Fire clay		1	
Sandstone		4	
Coal bloom, Hazard coal (?)	Elevation	1169	
Fire clay		2	
Covered		36	
Coal bloom, Wet Branch coal (?)	Elevation	1131	
Covered		39	
Coal stain, Young coal	Elevation	1092	
Covered		14	
Massive sandstone		60	
Light-gray shale, covered in part		32	
Good coal bloom, Haddix coal	Elevation	986	
Covered		16	
10 to 12 inch cannel coal	Elevation	970	
Massive sandstone		45	
Fire Clay coal { Coal 8" Flint fire clay. 4" Coal 11" }	Elevation	925	
Gray shale		10	
Black bituminous shale			6
Shale		5	
10-inch coal	Elevation	915	
Sandstone		15	
Blue shale		5	
Foot of hill			

The main bed of the Hazard coal may come in the 38 feet of covered interval above what is called the Wet Branch coal, instead of the bloom only 31 feet below the Flag.

A section down the first right branch 3/4 mile up Cow creek shows:

Section

				Feet
Covered				
Sandstone				3
7-inch coal, Hamlin coal			Elevation	986
Massive sandstone				47
Fire Clay rider		Coal 2" Shale 2" Coal 5"	Elevation	939
Covered				14
Fire Clay coal		Coal 8" Flint fire clay 4" Coal 5"	Elevation	925
Shaly sandstone				33
Whitesburg	Coal	Coal 10" Cannel coal 4"	Elevation	892
	Shale			18
	Coal	Black bituminous shale 4" Coal 9"	Ele.	874
Fire clay				2
Covered (arenaceous shale in place)				33
Creek at mouth			Elevation	839

A generalized section for the fourth left branch of Cow creek, 1¼ miles up, is given below:

Section

			Feet
Good bench and reported coal bloom—probably Flag coal		Elevation	1188
Covered			110
12-inch coal bloom, Young coal or low split of it, elevation			1078
Shale			1
Covered			5
Massive sandstone			20
Covered			114
Fire Clay coal	Coal 8" Flint fire clay 5" Coal 10"	Elevation	938
Sandstone			25
11-inch coal		Elevation	913
Sandstone			3
Shale			7
7-inch coal in bed of branch at forks—probably Whitesburg		Elevation	903
Shale and covered			55
Creek level at mouth of branch		Elevation	848

The 12-inch coal at elevation 1078 is a little low for the Young coal. It is probably a low split of that coal.

A section on the third right branch, 1¾ mile up the creek, shows:

Section		*Feet*
Top of point	Elevation	1118
Covered		30
Sandstone		50
Covered		10
Massive sandstone		50
Covered		20
Bloom of Fire Clay rider	Elevation	948
Covered		15
Fire Clay coal, bloom 20 inches thick	Elevation	933
Covered		20
10-inch coal bloom	Elevation	913
Shale		20
Whitesburg coal { Black shale 2" Coal 7" }	Elevation	893
Fire clay		2
Shale, covered in part		32
Creek level at mouth of branch	Elevation	859

A section on the seventh left branch, 2¼ miles up the creek, shows:

Section		*Feet*
Opening into a coal bloom, said to be slipped. Coal should be higher up. Bloom reported 38 inches thick. This is the Flag coal	Elevation	1232
Covered		40
Coal bloom, Hazard coal (?)	Elevation	1192
Covered		185
Massive sandstone		20
Fire Clay rider { Coal 4" Shale 1" Coal 8" }	Elevation	987
Covered		33
11-inch coal	Elevation	954
Sandstone		5
Bluish-gray shale		18
Whitesburg coal taken from branch one-fourth mile from mouth	Elevation	932
Shale, covered in part		60
Creek level at mouth of branch	Elevation	872

LEFT FORK OF COW CREEK

Up a right drain, ¼ mile up the left fork of Cow creek, the following section was made:

Section		*Feet*
Massive sandstone		8+
Fire Clay rider { Coal 3" Shale ½" Coal 8" }	Elevation	1022
Covered		30
8"+ coal	Elevation	992
Covered		20
7"—8" coal	Elevation	877
Covered		97
Creek level	Elevation	880

From the forks to 1 mile from the head of the Left fork of Cow creek, the blue and gray shales containing calcareous concretions, coming below the Fire Clay coal in this region, are very prominent along the stream, rising about as the creek does.

One-half mile up the left fork and 100 yards up a left branch the Whitesburg coal shows by natural exposure.

Whitesburg Coal

	Feet	Inches
Shale	10	
Black bituminous slate	2	
Coal		5
Fire clay		
Elevation	985	

This coal is seen at points all along the stream, showing the same section until it goes under drainage ½ mile farther up, at elevation 990.

A section toward head of Left fork, from the point where the Whitesburg coal goes under drainage, shows:

Section

			Feet
Whitesburg coal		Elevation	990
Shale			5
Sandstone			5
Coal, upper seam of Whitesburg	Black bitum'ous shale..6" Arenaceous shale......2' Soft shale............1' Coal ....8"	Elevation	1000
Sandstone			5
Covered			17
Fire Clay coal, showing 4-inch coal and 1-inch flint fire clay		Elevation	1025
Shale			4
Sandstone			4
Shale			22
Fire Clay rider	Coal ....2½" Shale .... ½" Coal ....7"	Elevation	1055
Massive sandstone			25
Covered blue shale in places, 15-foot coal bloom (Haddix) at			1075
Massive sandstone			40
Covered			80
Coal bloom, Hazard		Elevation	1215
Covered			100
Base of massive sandstone cliffs with a slight coal bloom beneath—Flag Coal rider		Elevation	1316
Top of ridge at head of Puncheon creek of Middle fork		Elevation	1326

RIGHT FORK OF COW CREEK

One-eighth mile up, on the left, 2 feet above the stream, a thin coal 5 inches thick with 2 feet black shale above is the Whitesburg coal.

Three-eighths mile up, up the first right branch, the following section shows the several coals found:

Section

	Feet
Top of point .... Elevation	1290
Covered, massive sandstone showing in places	30

Opening into a coal reported 18 inches thick at the base of a massive sandstone. Elevation, 1260. This is probably the Flag Coal Rider, although its interval to the Flag coal is unusually high.

Covered	55
Entry into Flag coal on top of ridge, on the right of the road, belonging to Dick Lykins .... Elevation	1205

Flag Coal

	Feet	*Inches*
Soil	5	
Shale		12
Coal		20+
Coal reported		7
Elevation	1205	
Covered	20	
Massive sandstone	65	
Covered	70	
Massive sandstone	40	
Covered	26	
Massive sandstone	50	
Shale	12	
Fire Clay rider .... Elevation	936	
Covered	5	
Shale and shaly sandstone	15	
Fire Clay coal { Coal .... 8" Flint fire clay ... 5" Coal .... 5" } Elevation	916	
Shale	6	
Coal { Black bituminous shale .. 9" .... 1" } .. Elevation	910	
Shale	20	
Creek level at mouth of branch .... Elevation	890	

One mile up the right fork of Cow creek the Fire Clay coal goes under drainage at elevation 925. A section on the right at this point shows:

Section

			Feet
Massive sandstone			10+
Hamlin coal	Coal 5" Shale ½" Coal 9"	Elevation	965
Covered			17
Sandstone			10
Coal	Coal 16" Shale 2" Coal 16"	Fire Clay rider.... Elevation	938
Shale			13
Fire Clay coal	Coal 11" Flint fire clay 4" Coal 6"	Elevation	925

The Fire Clay Rider goes under drainage ¼ mile farther up, at elevation 980.

A section on to the head of the creek shows:

Section

	Feet
Massive sandstone	20
Thin coal in bed of branch. This coal, which is about the horizon of the Haddix coal, rises with the stream and goes under drainage at 1030, one-half mile further up. Covered to head of stream.............Elevation	1000

One-half mile above the mouth of Cow creek, up the fifth right branch of Johnson creek, the Haddix coal was opened, now caved, by Buell P. Simmon, at elevation 938. He reported it to be 33 to 36 inch coal, of which the lower 12 inches was cannel coal. Below this opening, at elevation 883, the Fire Clay coal is exposed, showing less than 12 inches of coal.

LONG BRANCH

This branch empties into Johnson creek, on the right, 3¼ miles up. Elevation at mouth, 834. The Haddix coal is opened on the left, ¼ mile up, by G. H. Bandy. It shows:

Haddix Coal

	Feet	Inches
Soil	5	
Coal		30
Clay		
Elevation	932	

Solid coal had not been reached when the opening was visited.

At the forks of Long branch the Fire Clay coal is in the bed of the branch at elevation 842.

One-fourth mile up the right fork the Johnson Creek fault crosses, having a throw of 98 feet.

A section up the right fork, above the point where the fault crosses, shows:

Section

			Feet
Shaly sandstone			8
12-inch coal		Elevation	934
Shale			7
Fire Clay coal	Coal 12" Flint fire clay 3" Coal 12"	Elevation	941
Covered (sandstone ?)			30
17-inch coal, Hamlin coal (?)		Elevation	971
Massive sandstone			33
Elevation of Haddix coal opened in places given below			1004

(1) One hundred yards from head of branch, up a left drain, by Frank Gullet.

Haddix Coal

	Feet	*Inches*
Sandstone	2	
Gray shale	2	
Splint coal		21
Cannel coal		11
Fire clay floor		
Elevation	1004	

(2) One hundred yards from the head of the branch, up a right drain, by Jake Johnson.

Haddix Coal

	Feet	*Inches*
Sandstone		
Shale	2	
Splint coal		18
Cannel coal		12
Fire clay shale floor		
Elevation	1004	

(3) Two hundred yards from the head of the branch, on the left, by Jake Johnson, shows:

Haddix Coal

	Feet	*Inches*
Sandstone		
Shale		
Splint coal		
Cannel coal		
Fire clay floor		
Elevation	1004	

(4) One hundred feet downstream from the above opening, an opening belonging to George Barnett gives the same section as above.

(5) One hundred and fifty yards farther downstream an opening by George Barnett.

Haddix Coal

	Feet	Inches
Soil		
Shale		18
Splint coal		32
Shale floor		
Elevation	1004	

A section up a right branch, ¼ mile up the left fork of Long branch, shows:

Section

			Feet
8-inch coal taken from branch at mouth		Elevation	904
Shale			21
Fire Clay coal	Coal 1" Flint fire clay 2" Coal 2"	Elevation	925
Shale			5
7-inch coal—upper seam of Fire Clay coal		Elevation	930
Shale			16
Fire Clay rider	Coal 4½" Shale 2 " Coal 8 "	Elevation	946
Gray shale			3
Sandstone			2+

Covered to head of the branch where, at elevation 1137, the Hazard coal, opened by G. H. Bandy, now partly filled with water, shows:

Hazard Coal

	Feet	Inches
Massive sandstone	4	
Gray shale		20
Coal		8
Shale and coal		5½
Coal		6+
Water		
Elevation	1137	

Another coal bloom 60 to 70 feet higher, near the tops of the knobs here, is the Flag coal.

The Johnson creek fault crosses the Left fork just below the mouth of this branch.

A section from the head of the Left fork to the mouth of above branch shows:

Section

			Feet
Intersection of roads		Elevation	1159
Covered			26
Coal bloom—Wet Branch coal		Elevation	1133
Covered			13
Massive sandstone—covered in places			97
Coal bloom, Haddix coal		Elevation	1014
Sandstone			20
Fire clay with coal bloom			5
Sandstone			20
Hamlin coal	Coal 5" Shale 2" Coal 8"	Elevation	969
Covered			22
Shale			12
Fire Clay coal	Coal 4" Flint fire clay 3"	Elevation	937
Shale			10
4-inch black bituminous shale		Elevation	927
Shale			8
11-inch coal		Elevation	919
Shale			10
8-inch coal		Elevation	909

TURKEY BRANCH

On right, 4¾ miles up Johnson creek. Elevation of mouth, 852.

On the right at the mouth of the branch the Fire Clay coal is exposed 20 feet above the creek at elevation 872. It shows 8 inches coal and 5 inches of flint fire clay.

On the lower part of this branch the strata dips strongly to the north to where the Johnson Creek fault crosses each fork.

On the left, ¼ mile up, the Flag coal (?) is opened by Cap Reed at elevation 1127.

Flag Coal

	Feet	*Inches*
Shale	10	
Blacfl fissile slate		5
Splint coal		11
Block coal		16
Shale floor		
Elevation		1127

One-eighth mile up the left fork of Turkey branch the Fire Clay Rider goes under drainage at elevation 900, showing 13-inch coal under massive sandstone.

One-fourth mile up the left fork of Turkey branch, on the left, Sherman Rudd had the Haddix coal opened at elevation 932, now caved. Forty-five inches of coal somewhat mixed with clay was measured in the cut. Ten feet above this opening blocks of the Fossil limestone were found.

One-half mile up the left branch the Johnson Creek fault is seen, almost directly in front of Bruce Rudd's house, with the massive sandstone coming beneath the Young coal in contact with the shales and thin coals of the Whitesburg horizon.

Up a right drain at this point the Young coal, opened by Bruce Rudd, shows as reported by him:

Young Coal

	Feet	*Inches*
Massive sandstone	5	
Shale	4	
Coal		12
Shale		1–3
Coal		20
Clay		
Elevation	1020	

This coal is within 150 feet of the fault and dipping at a considerable angle. Forty feet above it a small opening into a coal bloom showed 21 inches ± coal. Solid coal was not reached. This coal is probably the Hazard coal, although it is possible it is the Wet Branch coal because of the small interval.

Up a left drain, 100 yards above where the fault crosses the left fork, the following section was made.:

Section

	Feet	*Inches*
Opening into Haddix coal on right by Bruce Rudd . . . . Elevation	1025	
Haddix Coal		
Massive sandstone	8	
Cannel coal		10
Shale		2½
Splint coal		10
Covered	10	
Massive sandstone	10	
12-inch coal, Hamlin coal . . . . Elevation	1005	
Covered	20	
Fire Clay rider { Black bitumi's shale. 10" { Coal . . . . 14" } Ele.	985	
Fire clay	2	
Covered	13	

Fire Clay coal	Coal .... 10" Flint fire clay.. 3"	Elevation	970
Shale			25
9-inch black slate with 2-inch coal beneath		Elevation	945
Bluish-gray shale			10
10-inch coal in bed of creek, Whitesburg coal....		Elevation	925

Three-fourths mile up the left fork the Fire Clay coal goes under drainage at elevation 950, and one-eighth mile farther up the Fire Clay Rider at 962.

A section of the hill shows:

Section

		Feet
Top of ridge	Elevation	1173
Sandstone		43
Coal bloom, Wet Branch coal	Elevation	1130
Covered		29
Coal bloom, Young coal	Elevation	1101
Covered		17
Massive sandstone		34
10-inch coal bloom, Trace Fork coal (?)	Elevation	1050
Blue shale		4
Massive sandstone		26
Coal bloom, Haddix coal (?)	Elevation	1020
Covered		30
Massive sandstone		20
Shale		2
7-inch coal bloom	Elevation	968
Shale		6
Fire Clay rider	Elevation	962

Three-eighths mile up the right fork of Turkey branch, up a left branch ⅛ mile on the right, L. M. Robinette has facings into three coals which represent the Young (?) coal. The section shows:

Young (?) Coal

			Feet	*Inches*
Massive sandstone			10	
Shale				8
Cannel coal	1"	Elevation	1040	
Splint coal	11"			
Sandy shale	3"			
Coal	7"			
Covered			15	
Coal		Elevation	1025	20
Covered			16	
Black shale			4	
Coal		Elevation	905	16
Sandstone below				

These coals are dipping rapidly upstream, the Johnson Creek fault being only 75 to 100 yards north of them. In the head of this branch, but on the upthrow side of the fault, an opening, now caved, into a coal at elevation 1190 is the Flag (?) coal.

STATE ROAD FORK OF JOHNSON CREEK

Elevation of mouth, 855.

One-eighth mile up, in a right drain, the Flag coal opened by Jim Bandy shows:

	Feet	Inches
Gray shale	10	
Black slate		6
Splint coal		20
Block coal		10
Clay floor		
Elevation	1138	

In the drain below, at elevation 930, is a 12-inch coal, belonging at about the horizon of the Hamlin coal.

One-half mile up State Road fork, on the right, the Fire Clay coal shows:

Fire Clay Coal

	Feet	Inches
Shale		
Coal		15
Flint Fire clay		3
Coal		2
Elevation	880	

One mile up State Road fork, at the mouth of a large left branch, the Fire Clay coal is at elevation 893. This coal rises faster than the stream and goes under drainage near the head of the branch. Five thin coals, less than 12 inches thick, occurring in the 30 to 40 feet of shales below the Fire Clay coal, are seen at various points up this branch. It is uncertain whether these coals are splits of the Whitesburg or Fire Clay coal. The two lowest more likely belong to the former. A section up the fourth right branch, 1¼ miles up State Road fork, shows:

	Feet	Inches
Section		
Creek level Elevation	876	
Covered	10	
12-inch coal in branch Elevation	886	
Shale	6	
Coal		2
Black slate		6
Sandstone	4+	
Covered	10	
Fire Clay coal in bed of branch Coal 9" Flint fire clay 3" Elevation	906	
Shale	6	
8-inch coal Elevation	912	
Shaly sandstone	7	
Fossil limestone Elevation	919	

Two hundred feet upstream from the limestone the Johnson Creek fault crosses. The intervals up to this point are apparently much smaller than they actually are, due to the strong dip upstream. The interval from the Fire Clay coal to the Fossil limestone, however, is much smaller than usual. This is the case over the area at the head of Johnson creek and right fork of Middle fork, due to the Haddix coal and the strata between it and the limestone having been eroded before the deposition of the latter.

The section continued upstream from the point where the fault crosses shows:

Section

		Feet
Covered		45
10-inch coal in branch	Elevation	966
Covered		50
8-inch coal	Elevation	1016
Massive sandstone		50+
Covered		55

Young coal opened on right, ⅛ mile from head of branch, by Harrison Flint, shows:

Young Coal

	Feet	*Inches*
Shale	5	
Coal		27
Shale, reported		18
Coal, reported		20
Elevation	1121	

One and one-half miles up State Road fork, at the mouth of the fifth right branch, 11 inches of coal shows in the bed of the creek at elevation 880. One hundred and fifty yards up the branch the Fire Clay coal, showing 10 inches coal and 6 inches flint fire clay, goes under drainage at elevation 902, and 100 yards farther up the Fire Clay Rider at elevation 911. On up the branch is massive sandstone in the bed of the stream to where the fault crosses ⅛ mile farther up. Above this point the sub-Fire

Clay Coal shales show in the stream to the forks. A section up the right fork shows:

Section

		Feet
12-inch coal		Elevation 944
Sandstone		10
Fire Clay coal	Coal 10" Flint fire clay. 4" Bone coal 2"	Elevation 954
Sandstone		9
Covered		10
Shale		10
Fire Clay rider	Coal 6" Shale 2" Coal 7"	Elevation 983
Massive sandstone		10
Covered		15
6-inch coal near Haddix horizon		Elevation 1003
Covered		140

Opening, now caved, into the Hazard coal, on the left one-half mile up, by Harrison Flint.

Hazard Coal

	Feet	Inches
Sandstone	5	
Gray shale		12
Coal, reported		34
Elevation	1143	
Covered	31	
Top of hill in road ... Elevation	1174	

The super-Flag Sandstone cliffs are well developed on the ridge on the left at the head of this branch.

One-fourth mile up the left fork of this branch the Young coal was opened by Jim Oney and showed, as reported by him, 48 to 55 inches coal with an 8-inch shale parting. Elevation of opening, 1088.

One and three-fourths miles up State Road fork, in the head of a left drain back of his house, Leonard Patrick has the Hazard coal opened, which shows:

Hazard Coal

	Feet	Inches
Shale and soil mixed	10	
Black bituminous shale		5
Block coal		25
Shale floor		
Elevation	1167	

This opening, as is the case with the other openings into the Hazard coal on Johnson creek, is on a broad, prominent bench.

Two and one-half miles up State Road fork, in a left drain, just in Magoffin county, W. M. Patrick has an opening into the Young coal at elevation 1090.

Young Coal

	Feet	*Inches*
Massive Sandstone	5	
Coal		38
Fire clay		6
Elevation	1090	
Sandstone	6	

One-half mile up Wheelram fork of State Road fork, up the first left branch on the right, the Hazard coal opened by Harvey Elam shows:

Hazard Coal

	Feet	*Inches*
Shale	6	
Coal		27
Gray shale floor		
Elevation	1215	

The Young coal was reported to have been opened 60 feet below this opening, but is now completely caved.

A thin coal, dug into at elevation 1000, beneath these openings is the Fire Clay Rider or a coal near that coal.

Fire Clay Rider (?)

	Feet	*Inches*
Soil		
Coal		6
Shale		3
Coal		8
Elevation	1000	

A section on the left branch of Johnson creek, just below the mouth of State Road fork, shows:

Section

	Feet
Top of hill. Opening into the Flag coal just over the crest of the ridge......Elevation	1205
Covered	45
Massive sandstone	40
Covered	10
Massive sandstone	50
Covered	30
Massive sandstone	30
Coal bloom, Hamlin coal (?)......Elevation	1000
Shaly sandstone	20
Coal bloom, Fire Clay rider......Elevation	980
Shale	25
Fire Clay coal at foot of hill at head of branch at Ele.	955

Fire Clay coal (?) at foot of hill at head of branch at elevation 955.

A strong dip down-stream brings the Fire Clay coal (?) down to 920, where, on the right, 250 yards up the branch, it is opened.

Fire Clay Coal (?)

	Feet	*Inches*
Shale	2	
Coal		12
Flint fire clay		4½
Coal		7
Clay		
Elevation	920	
Covered below the opening	20	
Shale	10	
Whitesburg coal (?) { 10-inch coal...Elevation	890	
Shaly sandstone	15	
8-inch coal....Elevation	875	
Shale	20	
Creek level at mouth of branch.......Elevation	855	

One-half mile up Johnson creek above the mouth of State Road fork, in the head of the first right branch, the following section was made:

Section

	Feet
Caved entry in Flag coal, reported to be 36-inch coal .....Elevation	1222
10-inch coal, Fire Clay rider.....Elevation	952
Shale	12
Fire Clay coal... { Coal ....12 " Flint fire clay 3 " Coal .... 5½" } .....Elevation	940
Covered to mouth of branch.	

From the mouth of State Road fork, the strata rise rapidly up the main creek, bringing the Gun Creek coal above drainage 1¾ miles up. No coals are opened along this part of the creek. The Whitesburg coal is exposed 1½ miles above the State Road fork, ¾ mile up the fourth right branch, at elevation 956, in the bed of the branch. A section at this point on the right shows:

Section

	Feet
14-inch coal in gray shales—split of Fire Clay coal. Ele.	999
Covered	13
10-inch coal between gray shales.....Elevation	986
Shale, partly covered	30
Whitesburg coal { Black slate...........9" Coal ....3" } Elevation	956

The coals at 999 and 986 are near the horizon of the Fire Clay coal, the seam carrying the flint fire clay either coming between them or 10 to 12 feet above the upper one.

The Whitesburg coal is exposed again ⅜ mile farther up the creek, ¼ mile up the right fork of the fourth left branch above State Road fork. Here the following section was obtained:

Section

				Feet
Top of ridge			Elevation	1280
Covered				150
Coal bloom, Young coal			Elevation	1130
Sandstone—covered in part				120
10-inch coal beneath sandstone ledge			Elevation	1010
This is probably the Fire Clay Coal rider.				
Covered				25
Coal	Coal	4"	Elevation	985
	Fire clay	4"		
	Coal	5"		
Bluish-gray shale, covered in part				35
Whitesburg coal	Black slate	18"	Elevation	950
	Coal	5"		
Blue-gray shales with calcareous concretions				68
Mouth of branch			Elevation	882

A section up the fifth right branch, ⅜ mile farther up, shows the Whitesburg and two other thin coals above it, together with the Gun Creek coal.

Section

				Feet
Covered				
Shale with 3-inch coal bloom			Elevation 1070 to	1062
Covered				85
12-inch coal between shales			Elevation	977
Shale				10
8-inch coal between shales			Elevation	967
Covered				10
Whitesburg coal	Black slate	12"	Elevation	957
	Coal	5"		
Bluish-gray shale				69
Gun Creek coal	Coal	3 "	Elevation	888
	Shale	10 "		
	Coal	9+"		
	Coal reported	20 "		

The Gun Creek coal is in the bed of the creek at the mouth of the branch. It only shows above drainage for 100 yards.

The thin coal given in the three sections above are the branch coals of this part of Johnson creek. A generalized section for the right fork of the main creek is given below:

Section

		Feet
Top of ridge	Elevation	1390
Covered		20
Sandstone		40
Covered		60
Coal stain, Flag coal	Elevation	1270
Covered		40
Coal bloom, Hazard coal	Elevation	1230
Covered		15
Coal bloom, low split of Hazard or the Wet Branch coal	Elevation	1215
Covered		15
Massive sandstone		120
Blue shale, place of Haddix coal		35
Massive sandstone		25
Shale		5
Fire Clay rider—12-inch coal	Elevation	1015
Shale		10
Fire Clay coal: Coal 5" Flint fire clay 3" Coal 3"	Elevation	1005
Shale		15
Coal: Coal 5" Shale 3" Coal 8"	Elevation	990
Shale		5
8-inch coal	Elevation	980
Shale		10
Whitesburg coal: Black shale 9" Coal 5"	Elevation	970
Bluish-gray shale		65
Forks of creek	Elevation	905

A generalized section up Crane's Nest branch, or middle fork of the main creek, shows:

Section

		Feet
Covered from top of hill to	Elevation	1042
Massive sandstone		25
Fire Clay rider: Coal 5" Clay 16" Coal 4"	Elevation	1017
Shaly sandstone		17
Fire Clay coal: Coal 10" Flint fire clay 3" Coal 10"	Elevation	1000
Sandstone		30
Whitesburg coal, opened in several places by Hiram Rudd, one-half mile up on right	Elevation	970

Whitesburg Coal

	Feet	Inches
Black slate	2	
Coal		4
Blue shale		2
Sandstone		18
Coal		24
Bituminous sandstone		2
Blue shale	7	
Black shale		12
Coal		7
Bluish-gray shale carrying calcareous concretions	63	
Creek level at mouth .... Elevation	907	

One mile up the left fork of the main creek, up the third left branch, the following section was obtained:

Section

		Feet
Top of hill, where road comes out of Puncheon creek .... Elevation		1326
Massive cliff-forming sandstone		36
Coal stain .... Elevation		1290
Covered		54
Coal stain, Flag (?) .... Elevation		1236
Covered		46
Coal stain, Hazard (?) .... Elevation		1190
Covered		126
Massive sandstone		30
Covered		38
Massive sandstone		10
6-inch coal, Fire Clay rider .... Elevation		986
Shaly sandstone		15
Fire Clay coal	Flint fire clay .... 3"	
	Coal .... 12" Elevation	971
Shaly sandstone		10
Covered		7
Sandstone		2
18-inch coal, upper split of Whitesburg .... Elevation		952
Sandstone		8
Whitesburg coal	Black slate .... 12"	
	Coal .... 7" Elevation	944
Shale		20
Creek level .... Elevation		924

One and three-eighths miles up the left fork and 100 yards up the fourth left branch on the left the Whitesburg coal is opened by Dorsey Kelton and shows:

Whitesburg Coal

	Feet	Inches
Black slate	2	
Coal		16
Shale		2
Coal		8
Elevation	964	
Shaly sandstone to creek level at elevation	946	

A section above this opening shows several thin seams of coal at the Fire Clay coal horizon.

Section

		Feet
Massive sandstone		15
Covered		10
Shale		5
13-inch coal	Elevation	1030
Arenaceous shale		10
Coal: Coal 7" Shale 2" Coal 8"	Fire Clay rider (?)... Elevation	1020
Covered, shaly sandstone in part		20
7-inch coal	Elevation	1000
Covered		20
Coal: Black bituminous shale 6" Coal 6"	Elevation	980
Shale		16
Whitesburg coal	Elevation	964

The Whitesburg coal goes under drainage 1¾ miles up the left fork, showing 24 inches of coal with 3 inches of black bituminous shale above. The thin coals above it, at the horizon of the Fire Clay coal, go under drainage at points farther up.

Three-fourths mile up the left fork of the left fork, at elevation 1040, is the Fossil limestone in the bed of the creek.

An 8-inch coal at elevation 1085, ¼ mile farther up on the right, is a thin coal coming below the Young coal or a split of that bed.

Up a right drain ¼ mile farther up the Hazard coal is opened by Harlan Williams and shows:

Hazard Coal

	Feet	Inches
Gray shale	5	
Dark shale containing abundant plant remains, especially calamites		3
Coal		4
Light shale		8
Black shale		5½
Coal		28
Shale floor		
Elevation	1180	

On the opposite side of the drain, at elevation 1250 and 40 to 50 feet below the base of the massive cliff-forming sandstone, the Flag coal, exposed by a slip, showed:

Flag Coal

	Feet	*Inches*
Soil		
Coal		28
Soil		
Elevation	1250	

Farther up in the head of this branch, at the front of the hill the top of which is known as "Town Flats," the Hazard coal, opened by Greene Williams, shows:

Hazard Coal

	Feet	*Inches*
Sandstone	2	
Gray shale		18
Coal		4
Light shale		4
Dark shale		4
Coal		48
Shale floor		
Elevation	1190	

A thin 11-inch coal 60 feet below this opening, under massive sandstone, is a seam of the Young coal.

At the forks of the left fork, on the right, a coal dug into in digging a grave, is the Hazard coal at elevation 1180.

A section at the head of the right fork of the left fork shows:

Section

		Feet
Top of point	Elevation	1480
Covered		35
Coal bloom	Elevation	1445
Covered		15
Cannel coal bloom	Elevation	1430
Covered		20
4-foot coal bloom, Hindman coal	Elevation	1410
Covered		20
Massive sandstone		20
Puncheon Creek and High Rock sandstones		50
Coal stain, Flag Coal rider	Elevation	1300
Covered		80
Slipped coal bloom	Elevation	1220
Covered		45
Hazard coal comes in this interval at about elevation	1190 to	1200
Massive sandstone		25
Covered		110
Shaly sandstone		20
Massive sandstone		20
Foot of hill	Elevation	1000

MIDDLE FORK

Elevation of mouth, 820.

Middle fork, the largest tributary to Licking river lying in Magoffin county, drains an area of about 57 square miles. It divides into two forks 2¼ miles up, the left fork being a little the larger of the two. From the mouth to the forks and as far up the left fork as Bear branch, the bottomlands on this stream are unusually wide and level. The right fork has only three tributary branches which have been given names. These are as follows: Lick branch, 2½ miles up on the left; Puncheon creek, four miles up on the right, and Spruce Pine branch, five and one-half miles up on the left.

The left fork is larger, and has six tributaries that have been given names. They are as follows: Mill branch, 1¾ miles up on the right; Bear branch, on the left 4 miles up; Boardtree fork, 5½ miles up on the left; Craft's fork, 8½ miles up, and Spruce Pine fork, 8½ miles up.

The structure of the strata throughout the area drained by Middle fork is comparatively simple. Below the fork there is a decided dip from east to west, across the stream. From the forks to Boardtree fork of the left fork and Spruce Pine branch of the right fork the strata are nearly horizontal, but on to the head of the two forks from the points named there is a dip to the south which continues to the head of the stream.

The rocks exposed on the waters of Middle fork consist mostly of strata lying above the Fire Clay coal. On the lower part of the stream the area of the higher strata is small, but toward the head of the creek an up-stream dip brings the strata, usually high in the hills, down to a lower elevation, and strata coming 625 feet above the Fire Clay coal are found in the divide at the head of the creek.

Comparatively few openings into coals were found on Middle fork, taking it as a whole, but this is due mainly to the scarcity of openings on the lower part of the creek. Toward the heads of the different forks openings were more numerous, but few were in condition to be measured, and these into only two coal beds.

The intervals between the coals vary more or less at different points in vertical thickness and character of the included material. The coals coming above the Hazard coal are high in the hill or missing from the hill-tops altogether over the lower part of the creek, but in the dividing ridges on the left fork and its head these coals would underlie a large area. The Puncheon Creek and High Rock sandstones both form cliffs on Bear branch, Boardtree fork and Crafts fork, but the High Rock sandstone loses its cliff-forming character over the rest of the creek.

The Fugate coal was found opened in only one place, and there showed 30 inches of coal bloom, the opening being incomplete at the time visited. This coal comes in the covered interval between the two cliffs when both are developed, or 10 to 15 feet below the upper one. This coal would have very little area except in the ridge at the head of the creek.

The Flag coal was not seen opened where a measurement of its section could be made. However, it showed to be of good thickness toward the head of the stream, where it would also underlie a good area.

The Hazard coal is found on a wide prominent bench 40 to 50 feet below the Flag coal. The interval between it and that coal is massive, medium-grained sandstone, sometimes carrying a thin 3 to 4 inch coal, and a 10 to 12 inch seam of coal 5 to 10 feet above the main Hazard bed. This coal is a promising coal. Over the lower part of the creek this coal is well up in the hills, but toward the head it is low in the ridges and has a large area. It is believed to maintain a thickness of from 38 to 72 inches through the ridges at the head of the forks of Middle fork and the dividing ridge between Magoffin and Breathitt counties, extending from the left fork of Johnson creek through to the head of Oakley creek.

The Whittaker coal was not found opened in this area. A 12 to 14 inch coal at the horizon of this coal, which is about half-way between the Hazard and Young coals, was found in a number of places.

The Young coal, coming 50 to 70 feet below the Hazard coal, is also a promising coal. The upper part of the interval between it and the Hazard coal is massive sandstone, with two thin coals, the upper one the Whittaker coal, 20 to 25 feet below the Hazard, and the other in the remaining 25 feet of interval, which is sometimes sandstone and again soft gray shale. The Young coal is also well above drainage on the lower part of the creek, but has even a greater area than the Hazard coal toward the head, although it does not maintain as continuous a thickness of coal as that bed. It does, however, judging from the openings, maintain a thickness of from 36 to 48 inches of solid coal over the area at the head of the left fork of the right fork, and Spruce Pine and Crafts fork of the left fork of Middle fork, and through the dividing ridge between Magoffin and Breathitt counties, from the head of the right fork to the head of the left fork of Middle fork.

With the Young, Hazard and the Flag coal coming within an interval of 90 to 100 feet, the lowest just above drainage and each maintaining a good thickness of coal over as large an area as they do, the headwaters of Middle fork are especially promising as a future coal field.

The strata between the Young coal and the Fossil limestone vary from massive-bedded, medium-grained sandstone to soft blue-gray shales carrying several thin coals. Wherever it is sandstone the Young coal is of a good thickness, but wherever shale, it is split up into several thin beds. The thin coals were never seen to carry over 14 inches of coal and more generally 4 to 5 inches of coal.

The Haddix coal is split into several thin coals, none over 14 inches in thickness, coming 10 to 15 feet below the Fossil limestone, the interval being gray to blue-gray shales.

Thirty-five to 40 feet below the Haddix coal is the Hamlin coal, the strata between the two consisting of massive sandstone grading into shaly sandstone toward the top. This coal is remarkably persistent over the area drained by the right fork and Spruce Pine fork of the left fork of Middle fork, carrying from 10 to 14 inches of coal.

The Fire Clay coal is above drainage over most of the Middle Fork region, but was less than 30 inches of coal wherever seen and usually only 10 to 20 inches. The flint parting is always present, and over a small area around the mouth of Bear branch the coal is cannel coal. The interval between this coal and the Hamlin coal is massive sandstone in most cases, but shaly sandstone in some.

The 40 to 50 feet interval between the Fire Clay and Whitesburg coals is shaly sandstone over the greater part of the region, but is gray fissile shale and heavy-bedded calcareous sandstone in others, the latter being the case on the lower part of the creek between the forks and mouth, where a thin coal 20 to 25 feet below the Fire Clay coal is seen.

The characteristic black fissile slate is always found over the Whitesburg coal, which was not seen over 15 inches thick. Below the Whitesburg coal for 60 to 70 feet to the Gun Creek coal is gray, fissile shale, sometimes soft and at others very arenaceous, being more nearly shaly sandstone. The Gun Creek coal is above drainage from the mouth to Puncheon creek on the right fork, and to one mile above Bear branch on the left fork. It is opened in a number of places for local use and shows as much as 37½ inches of coal more or less diffused in the blue-gray shales which are prominent over the lower part of the creek.

The following is a detailed description of the coals seen over the Middle fork region.

A section on the left, at the mouth of Middle fork, shows:

Section

	Feet
Top of point....................Elevation	1390
Massive, cliff-forming sandstone—Puncheon Creek sandstone	80
Covered	65
Bench....................Elevation	1275
Covered	90
Bench....................Elevation	1165
Covered	185
Bloom of Fire Clay coal showing flint fire clay. Elevation	980
Covered	40
Arenaceous shale	10
Whitesburg coal { Black slate..........28" Coal, reported........10" } Elevation	930
Covered	10
Shaly sandstone	40
Covered	30
Massive sandstone	35
River level....................Elevation	820

A coal opened in the first left branch, ½ mile up Middle fork, shows:

Hamlin Coal (?)

	Feet	Inches
Coal		16
Shale		3½
Coal		6—7
Elevation	1002	

The interval to the Fire Clay coal here seems to be low for this to be the Hamlin coal, but the massive sandstone over the Fire Clay coal indicates that the Fire Clay Coal Rider is absent as is the case elsewhere. Up a drain on the opposite side of the branch from this opening the Fire Clay coal is opened.

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Shaly sandstone	3	
Coal		6
Flint fire clay (?)		4
Coal		2
Elevation	982	

There is some question as to this being the Fire Clay coal, as the flint fire clay does not show its usual characteristics.

One mile up the creek a section on the second right branch shows the Fire Clay coal and Whitesburg coals which have been taken from the branch.

Section

		Feet
Massive sandstone		20
12-inch coal	Elevation	943
Shale		5
Fire Clay coal	Elevation	938
Shaly sandstone		20
10-inch coal	Elevation	918
Sandstone		15
Coal with black slate above taken from branch (this is the Whitesburg coal)	Elevation	903
Bluish-gray shale with calcareous concretions		50
Massive gray sandstone		27
Creek level at mouth of branch	Elevation	826

One and one-fourth miles up the creek, on the third right branch, the following section was obtained from the top of the ridge to the mouth of the branch, along the road over to Cow creek:

Section

			Feet
Top of ridge		Elevation	1204
Sandstone			17
Good coal bloom—Flag		Elevation	1193
Covered			30
Coal bloom		Elevation	1163
Covered			10
Sandstone			10
Coal bloom—Hazard coal		Elevation	1143
Covered			40
Coal bloom—Whittaker coal		Elevation	1103
Covered			20
Slipped coal bloom—Young coal		Elevation	1083
Massive sandstone			33
Covered			11
Massive sandstone			26
Covered			40
Slight coal bloom		Elevation	973
Massive sandstone			25
Covered			9
Bloom of Fire Clay coal	Coal .... 4" Flint fire clay . 1½" Coal .... 6"	Elevation	939
Blue shaly sandstone			26
6-inch coal		Elevation	913
Blue-gray shale			40
Sandstone			46
Creek level at mouth		Elevation	827

Two miles up the creek a section on the fourth right branch shows the Fire Clay and probably the Whitesburg coals, which are the branch coals of the lower part of Middle fork.

			Feet	Inches
Sandstone			13	
Fire Clay rider				10
Shale			11	
Fire Clay coal	Black bituminous shale 3" Shale .... 9" Splint coal .... 9" Flint fire clay........ 3½" Coal .... 9½"	Ele.	965	
Shale			26	
9-inch coal—Whitesburg coal (?)		Elevation	939	
Shale			18	
Covered			12	
Sandstone			9	
Shale			6	
Covered			10	
Gray-blue shale			10	
9-inch coal		Elevation	864	
Bluish-gray shale			20	
Covered			10	
Elevation at mouth of branch			834	

Three hundred yards below the forks of Middle fork, on the left, the Gun Creek coal, opened by Harris Goultz, shows:

Gun Creek Coal

	Feet	Inches
Gray shale	6	
Dark-blue shale	5	
Coal		5
Shale		19
Coal		3+
Mud and water.		
Elevation	870	

RIGHT FORK OF MIDDLE FORK

Elevation of mouth, 836.

One-fourth mile up on the left, in a small drain, the Gun Creek coal, opened by Bryan Arnett, shows:

Gun Creek Coal

	Feet	Inches
Gray shale	5	
Shale and coal		8
Gray shale		1
Coal		15+
Mud and water		
Elevation	866	

Five-eighths mile up the right fork, up the first right branch, are two caved openings into the Gun Creek coal on Will T. Arnett's place, at elevation 866. Farther up in the head of this branch the Fire Clay coal and its rider show:

Fire Clay Coal and Rider

		Feet	Inches
Rider	Massive sandstone		
	Shale		12
	Coal		6 to 8
Elevation		976	
Fire clay		1	
Arenaceous shale		14	
Black bituminous shale			2
Flint fire clay			2½
Black bituminous shale			1
Shale			

One and one-half miles up the right fork, at Bourland Dower's, the Gun Creek coal was opened and showed:

Gun Creek Coal

	Feet	Inches
Shale	3	
Coal		21
Shale floor		
Elevation	875	

Three thin coals, less than 1 inch in thickness, come in the first 15 feet of shale above this coal.

One and three-fourth miles up the right fork, on the left at the mouth of the fourth right branch, the Gun Creek coal, opened by Leslie Higgins, shows:

Gun Creek Coal

	Feet	Inches
Gray shale	15	
Coal		2
Shale		2+
Coal, reported		22
Elevation	870	

One-fourth mile up the fourth right branch, in a little drain in front of a house, the Whitesburg coal shows 7-inch coal beneath 2 feet of black slate. Elevation 928.

Two miles up the right fork a section from the top of the ridge in the road from the left fork of Middle fork to the mouth of the fifth left branch of the right fork shows:

Section

				Feet
Strong bloom in road at top of hill—Hazard coal			Ele.	1208
Massive sandstone				46
Covered interval				105
Massive sandstone				30
Hamlin coal	Coal	1"	Elevation	1027
	Fire clay	4"		
	Coal	4"		
	Clay	1"		
	Coal	2"		
Shaly sandstone				32
Fire Clay coal	Coal	4"	Elevation	995
	Flint fire clay	2"		
	Coal	9"		
Shaly sandstone				23
6-inch coal			Elevation	972
Shaly sandstone				24
Caved opening into Whitesburg coal on right at foot of hill			Elevation	948
Covered				22
Light gray shale				30
Gun Creek coal	Blue shale	2 '	Elevation	896
	Dark soft sandstone containing marine fossils (Brachiopods)	8 "		
	Black shale	2 "		
	Coal	5½"		
	Shale	6 "		
	Cannel coal	7 "		
Covered				20
15-inch coal on right at mouth (Lower split of the Gun Creek coal)			Elevation	876
Shale—part covered				20
Creek level at mouth of branch			Elevation	856

LICK BRANCH

Two and one-half miles up right fork on left. Elevation at mouth, 860.

Three-eighths mile up Lick branch, on the left, the Gun Creek coal has been opened and shows:

Gun Creek Coal

	Feet	Inches
Shale	2	
Coal		7
Shale		14
Coal		1
Shale		1
Coal		21
Clay		
Elevation	900	

A section up the first right branch, 3/8 mile up Lick branch, shows:

Section

			Feet
Covered			
Fire clay coal bloom	Coal 2" Flint fire clay 2"	Elevation	1010
Covered			20
Shaly sandstone			32
Whitesburg coal	Black slate 3 ' Coal 8"+	Elevation	958
Covered to mouth of branch			

One-half mile up Lick branch, on the left, an opening into the Gun Creek coal shows:

Gun Creek Coal

	Feet	Inches
Blue shale	20	
Coal		1
Shale		3
Coal		5
Shale		2½
Coal		2
Shale		1
Coal		2
Shale		6
Coal	21	
Shale floor		
Elevation	887	

This coal goes under cover 100 yards farther up at elevation 886.

Seven-eighths mile up Lick branch, on the right and

15 feet above the branch, the Whitesburg coal shows the following section:

Whitesburg Coal

	Feet	*Inches*
Black slate	3	
Coal		13
Elevation	923	
Shale to branch		

This coal dips up-stream and goes under drainage ⅛ mile farther up at elevation 915.

One hundred yards up the second left branch, which is 1⅛ miles up Lick branch, the Fire Clay coal is in the bed of the branch at elevation 945. It shows 10+ inches of coal with 1-inch flint fire clay parting. A section up this branch shows:

Section

		Feet
Covered		
Massive sandstone		20+
In head of the left fork of the branch is a digging into the Young coal (?) showing 24-inch coal between massive sandstone at elevation		1145
Massive sandstone		95
Covered		20
18-inch coal—Haddix	Elevation	1030
Covered		28
Massive sandstone		20
Shale		2
10-inch coal—Hamlin coal	Elevation	980
Shale		5
Massive sandstone		30
Fire Clay coal	Elevation	945

The Fire Clay coal goes under drainage 150 feet above the mouth of the branch at elevation 945. The Hamlin coal, 35 feet above it in the section, shows at various points until it goes under cover ¼ mile farther up.

Two miles up Lick branch (almost to the head of the branch), 100 yards up a left branch, a coal was dug from the bed of creek at elevation 1030. This is the same as the 18-inch seam in the section above and is the Haddix coal. Fifty yards farther up the branch, in the bed of the branch at elevation 1035, is the Fossil limestone.

A section to head of the main creek along the road up the hill, beginning at the elevation of the limestone, shows:

Section

		Feet
Top of hill and level of base of massive sandstone cliffs	Elevation	1250
Covered		80
Bench and slipped coal bloom	Elevation	1180
Covered		90
Massive sandstone		50
Covered		15
Level of limestone	Elevation	1035

One-half mile above the mouth of Lick branch, on the left, the Gun Creek coal, opened by Adam Stevens, shows:

Gun Creek Coal

	Feet	Inches
Shale	5	
Coal		12
Shale		3
Coal		3
Shale		7
Coal		16
Elevation	896	

One-fourth mile farther up, up a left drain, the Hamlin coal shows 16 inches of coal under a ledge of massive sandstone at elevation 1046. This coal was also dug into up a right branch on the opposite side of the creek, back of W. K. Dyer's house. The opening was caved when visited.

Three-fourth mile above the mouth of Lick branch, on the right (200 yards above W. K. Dyer's house), the Whitesburg coal is at elevation 950, and shows 6 inches of coal with 4 feet black slate above.

Five-eighths mile below the mouth of Puncheon creek, in the head of the tenth right branch, a prospect into the Fire Clay coal at elevation 990 shows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	2	
Shaly sandstone	2	
Coal		9
Flint fire clay		3
Coal		6
Fire clay		6+
Elevation	990	

PUNCHEON CREEK

Four miles up right fork on the right. Elevation of mouth, 890.

One-fourth mile up, on the right, a section down a right drain shows:

Section

				Feet
Massive sandstone				20+
Fire Clay coal	Coal	9"	Elevation	982
	Flint fire clay	3"		
	Coal	8"		
Shaly sandstone				10
Covered				37
Shale				5
Whitesburg coal	Black slate	3'	Elevation	930
	Coal	7"		
Covered to creek level				

One-half mile farther up the Whitesburg coal goes under drainage, showing 6-inch coal at elevation 928. Up a right branch at this point the Fire Clay coal shows 10-inch coal and 3-inch flint fire clay at elevation 980. Ten feet below this seam is a 6-inch seam of black bituminous shale. This shows the Fire Clay coal beginning to split up into several beds of thin coals, as it is found at the head of this creek, on the right fork of the right fork, and left fork of Johnson creek.

One hundred yards up the left fork of Puncheon creek the bed of black bituminous shale goes under drainage at elevation 960. Two hundred yards farther up the Hamlin coal shows 12-inch coal beneath massive sandstone at elevation 995.

In the head of the left fork of Puncheon creek the Hazard coal is opened by K. N. Risner to show:

Hazard Coal

	Feet	Inches
Massive sandstone	8	
Gray shale	2	
Coal		45
Shale		8+
Elevation	1175	

The opening was in a poor condition for measurement when visited, and the section was made on the weathered coal in the cut. A general section for this branch shows:

Section	*Feet*	*Inches*
Hazard coal Elevation	1175	
Massive sandstone	45	
Covered	20	
Massive sandstone	58	
Shale	3	
Dark-gray, impure, fossiliferous limestone	8	
Shale	9	
Haddix coal in bed of branch, three-fourths mile from mouth of fork-section: Coal 7" Blue shale 6" Coal 3" E.	1040	
Shaly sandstone	10	
Massive sandstone	20	
Hamlin coal Elevation	1010	
Shaly sandstone	35	
Covered	10	
Lower bed of Fire Clay coal Elevation	965	
Covered to mouth of fork		

Up the right fork of Puncheon creek, 200 yards, on the right, the Fire Clay coal at elevation 960 shows:

Fire Clay Coal	*Feet*	*Inches*
Sandstone	5	
Shale	8	
Black bituminous shale		4
Coal		5
Black bituminous shale		2
Flint fire clay		3½
Black bituminous shale		3
Elevation	970	

Three-eighths mile up the right fork, up the long left branch, the following section was obtained:

Section	*Feet*	*Inches*
Massive sandstone	80	
Gray shale	2	
Hard, blue, fossiliferous limestone	1	
Blue shale	2	
Dark-gray, impure fossiliferous limestone, full of crinoid fragments		6
Blue shale	5	
Haddix coal: Coal 7" Shale 4" Coal 3" Elevation	1030	
Shaly sandstone	10	
Massive sandstone	20	
13-inch coal—Hamlin Elevation	1000	
Sandstone	10	
Covered	35	
Mouth of branch Elevation	955	

Three-fourths mile up the right fork of Puncheon creek the Hamlin coal shows 13-inch coal on the right at elevation 1015. The section obtained on to the head of the creek above this point shows:

Section

	Feet	Inches
Top of ridge in road..................Elevation	1326	
Puncheon Creek sandstone	30	
Covered	6	
Coal bloom..........................Elevation	1290	
Covered	145	
Massive sandstone	80	
Shale	4	
Dark blue, fossiliferous limestone	2	
Blue shale	4	
Dark-gray, impure fossiliferous limestone, full of crinoid fragments		6
Bluish-gray shale	6	
Coal bloom—Haddix coal.............Elevation	1049	

One-fourth mile above the mouth of Puncheon creek, up the main right fork, the Whitesburg coal shows 7-inch coal with 2 feet of black slate above, on the right, at elevation 950.

Three-eighths mile above Puncheon creek in the head of a right drain the Hazard coal, opened by Benton Howard, shows:

Hazard Coal

	Feet	Inches
Massive sandstone		
Shale	1	
Coal		14+
Coal, reported		10
Elevation	1190	

Three-fourths mile above Puncheon creek on the right at the mouth of a right drain is the following section:

Section

	Feet	Inches
Lower edge of good bench Elevation	1175	
Covered	35	
Massive sandstone	80	
Covered and coal float—Haddix coal	12	
Sandstone	18	
Coal bloom—Hamlin coal		12
Sandstone	20	
Coal bloom—Fire Clay rider		4
Fire clay	2	
Shale	11	
Fire Clay coal { Coal 2" Flint fire clay 2" } Elevation	985	
Sandstone	10	
5-inch coal bloom Eleavtion	975	
Shale	38	
Black slate	2	
7-inch coal—Whitesburg Elevation	935	
Covered to creek level at	904	

Seven-eighths mile above Puncheon creek, up a left branch, the Whitesburg coal goes under drainage at 935, and farther up the branch the thin beds of the Fire Clay coal. One-half mile up, 12 inches of coal under a sandstone ledge, at elevation 975, is the upper seam of the Fire Clay coal. Above this, at elevation 1000, is a coal bloom probably the Hamlin coal. In the head of a left drain at this point a 24-inch bed of coal between massive sandstones is believed to be the Young coal, although the interval to the Fire Clay coal appears to be small.

On the right, just beneath the mouth of Spruce Pine branch, the Fire Clay coal shows at elevation 974.

Fire Clay Coal

	Feet	Inches
Massive sandstone	6	
Coal		6
Black bituminous shale		4
Flint fire clay		6
Black shale		8
Elevation	974	

In the head of a right drain at this point an opening into the Haddix coal on the place of Charley Montgomery shows:

Haddix Coal

	Feet	*Inches*
Massive sandstone	10	
Shale	2	
Coal		10
Shale		2
Coal		2+
Elevation	1044	

SPRUCE PINE BRANCH

Five and one-half miles up right fork on left. Elevation of mouth, 914.

Two hundred yards up the Whitesburg coal goes under drainage at elevation 935.

Three-eighth mile up, in the head of the first left branch, the Young (?) coal has been opened at elevation 1087, and was reported to be 36 to 42 inches thick by Dan Greene, on whose place the opening was made. A section down this branch is as follows:

Section

		Feet
Base of massive sandstone cliffs	Elevation	1270
Covered		100
Good bench	Elevation	1170
Covered		83
Opening into Young coal	Elevation	1087
Covered		52
Massive sandstone		40
1-foot hard, blue, fossiliferous limestone	Elevation	995
Dark-blue, fossiliferous shale		3
6-inch impure crinoidal limestone	Elevation	992
Blue shale		2
3-inch coal	Elevation	990
Shaly sandstone		13
Coal { Coal 11" Fire clay 6" Coal 7" }	Haddix coal. Elevation	977
Shaly sandstone		10
10-inch coal bloom	Elevation	967
Shale		14
Creek level	Elevation	953

One-half mile up, up a right drain, the Young coal is opened on the place of the Bud Dower heirs and shows:

Young Coal

	Feet	Inches
Massive sandstone	5	
Coal		18+
Coal, reported		18
Elevation	1072	

On the opposite side of this drain are two beds beneath massive sandstone at 1082 and 1092, each 12 inches thick and separated by 10 feet of shaly sandstone. These beds are evidently splits of the Whittaker coal.

At the forks of Spruce Pine branch, ½ mile up, what is probably the Hamlin coal is 2 feet above the bed of the creek. A section from this point to the head of the right fork shows:

Section

			Feet
Coal—Hamlin	Coal 10" Shale 5" Coal 7"	Elevation	966
Covered			14
Coal	Coal 3" Shale 3" Coal 12"	Low split of Haddix..Elevation	980
Sandstone			10
Blue shale			1
Gray shale			6
5-inch coal—Haddix (?)		Elevation	997
Shaly sandstone			20
6-inch impure, gray, fossiliferous limestone containing many fragments of crinoids. (This point one-half mile above the forks.)		Elevation	1017
Blue shale			10
Covered			15
Massive sandstone			55
Opening into Young coal (?) in head of creek, by Larkin Dower.			

Young Coal

	Feet	Inches
Massive sandstone	8	
Gray shale		6
Coal		24
Shale		
Elevation	1097	

One half mile up Right fork above Spruce Pine branch, up the second right branch, the following section was obtained:

Section

	Feet
Covered from top of hill to bloom of Hazard coal exposed by a slip, three-eighths mile up the branch on right. Also level of wide bench on which Hazard is found. This slip reported to have exposed a coal 4½ to 5 inches in thickness ....Elevation	1190
Covered	64

Coal float in branch, almost in head of branch. A 3½ to 4 feet bed of coal, the lower half cannel coal, is reported to have been dug into here. This is the Young coal (?).

	Feet
Elevation	1126
Covered	72
Massive sandstone	8

Haddix coal, opened ¼ mile up the branch, in the head of a right drain, by Farrish Montgomery. Elevation, 1046.

Haddix Coal

	Feet	Inches
Sandstone		
Shale		2
Coal		9
Shale		2
Coal		8
Black bituminous shale		8
Shaly sandstone	10	
Covered	30	
Massive sandstone	10	
Hamlin coal { Massive sandstone 10' Coal ... 13" Shale } Elevation	996	
Shale	3	
Covered	10	
Sandstone	3	
Bluish bituminous shale..		9
Shale	3	
Fire Clay coal, ¼ mile up on right { Black bitum's shale 6" Flint fire clay 4" } Ele	971	
Shaly sandstone	17	
Coal		2
Covered	34	
Level at mouth of branch .... Elevation	920	

One and one-fourth miles above Spruce Pine branch up a left branch the Young coal, opened by Ben Holbrook, ¼ mile up on left, shows:

Young Coal

	Feet	*Inches*
Massive sandstone	10	
Coal		36 to 38
Shale	2	
Elevation	1050	

One-fourth mile below this opening, in the bed of the branch, at elevation 981, is an exposure of the fossiliferous limestone.

One and one-half miles above Spruce Pine branch, in the head of a right branch, the Hazard coal was opened by Grant Risner at 1165. Opening now caved. He reported the coal to be 40 inches thick. A section below this opening to mouth of branch shows:

Section

	Feet	*Inches*
Coal ....Elevation	1165	
1-inch dark-blue fossiliferous limestone....Ele.	1025	
Dark-blue fossiliferous shale	2	
Dark-gray, impure fossiliferous limestone containing fragments of crinoids		6
Blue shale	5	
Haddix coal { Coal ....8" Shale ....6" Coal ....3" } Elevation	1018	
Massive sandstone	50	
Hamlin coal—13-inch coal....Elevation	968	
Shaly sandstone	10	
Covered	5	
Creek level at mouth of branch....Elevation	953	

One-fourth mile below the forks of Right fork, on the right, is a caved entry into the Hazard coal on place of J. A. Wedges at elevation 1130. Prof. Crandall (Bulletin 10, Ky. Geol. Sur.) gives the following section for this coal:

Hazard Coal

	Feet	*Inches*
Roof—slaty rock		
Coal		24
Clay		½
Splint coal		25
Shale, part bituminous		15
Coal		24
Sandrock below		

One hundred yards up the right fork of Right fork a coal bloom at 1005 is probably that of the Haddix coal. Three-eighths mile up the right fork of a left branch the following section was obtained:

Section

	Feet	Inches
Bench ....Elevation	1180	
Covered	35	
Massive sandstone	45	
15-inch coal, upper bed of Young coal..Elevation	1100	
Blue shale	10	
Coal		11
Bluish-gray shale..........................	43	
Coal		1
Blue shale	2	
Sandstone	5	
Coal		1
Black bituminous shale......................		4
Shaly sandstone..........................	20	
Fossil limestone....................Elevation	1020	
Covered	20	
Elevation mouth of branch..................	1000	

On the right at mouth of this branch the Haddix coal shows:

Haddix Coal

	Feet	Inches
Sandstone	2	
Arenaceous shale	8	
Coal		1
Blue shale		2
Coal		2
Gray shale	2	
Creek level		
Elevation	1000	

The coals in the section above, from 1100 to 1038 are the split seams of the Young coal.

Three-fourth mile up the right fork, up a right drain known as Coal Hollow, the Hazard coal is opened, by Newton Rome, and shows:

Hazard Coal

	Feet	Inches
Shaly sandstone	3	
Coal		8
Shaly sandstone	8	
Coal		7
Shale		24
Coal		36+
Coal, reported..........................		12 to 16
Elevation	1165	

The opening was in a poor condition for measurement when visited.

Below this opening massive sandstone shows to 1085. Then:

	Feet
Covered	10
Shaly sandstone	45
Fossil limestone .... Elevation	1030

One-fourth mile up the creek from Coal Hollow a coal reported to be 24 inches coal was opened at 1140. This coal is 80 feet above the Fossil limestone, which shows in the branch near its mouth, and is the Young coal. A strong dip downstream is noticeable in this branch.

A section from the mouth of the branch discussed above to the top of the hill shows:

Section

			Feet
Top of hill .... Elevation			1365
Covered			15
Sandstone			10
Covered			10
Massive sandstone			20
Covered			70
Massive sandstone			20
Covered			20
Good bench .... Elevation			1200
Covered			20
Hazard coal .... Elevation			1190
Massive sandstone			30
Covered			20
Place of Young coal			
Massive sandstone			50
Covered			20
8-inch dark-gray, impure crinoidal limestone.. Elevation			1070
Foot of hill			
Arenaceous shale			10
Dark blue shale			5
Haddix coal	Black bituminous shale	6"	Elevation 1055
	Coal	4½"	
	Shale	5"	
	Black bituminous shale	6"	
	Blue shale	3"	
	Coal	6"	
	Black bituminous shale	8"	
	Blue shale	2"	
	Coal	1"	
Gray shale			10
Creek level, one-eighth mile from foot of hill... Elevation			1040

Up a left drain at the foot of the hill, where the road goes up to Town Flats, the Hazard coal was opened—now caved—by John W. Hobrook at elevation 1190. The following is a bed section as reported by him:

Hazard Coal

	Feet	Inches
Shaly sandstone		
Coal		18
Shale		9
Coal		24
Shale		8
Coal		14

One-fourth mile up the left fork of Right fork, at the mouth of what is known as Road fork, the Fossil limestone is in the bed of the creek at elevation 995.

One-half mile up Road fork the Hazard coal is opened, on the right, by John Andy Wedges, to show:

Hazard Coal

	Feet	Inches
Shaly sandstone	6	
Coal		4
Shale		2½
Coal		33
Shale		2
Coal		6
Shale floor		
Elevation	1133	

Fifty feet below this opening is an opening into the Young coal, which shows:

Young Coal

	Feet	Inches
Sandstone	3	
Coal		15+
Coal, reported		21
Water		
Elevation	1080	

Covered to creek level, where massive sandstone shows down to the limestone.

Three-eighths mile farther up Road fork the Young coal is opened at elevation 1080, by the roadside on the left.

Young Coal

	Feet	Inches
Massive sandstone	8	
Gray shale		15
Coal		18
Shale		(?)
Coal, reported		18
Water		
Elevation	1080	

A section up Road fork to the top of the ridge, between it and the Licking fork of Hunting creek, shows:

Section

		Feet
Top of ridge in road	Elevation	1230
Covered		90
Massive sandstone		20
Coal bloom—Hazard coal	Elevation	1120
Covered		40
Young coal	Elevation	1080

Up the left fork of Right fork, 1/8 mile above Road fork, the Hazard coal opened on the right by Charley Bays shows:

Hazard Coal

	Feet	Inches
Shale and soil	5	
Coal		5
Shale	2	
Coal		1
Shale		1
Coal		3
Shale		2½
Coal		8
Shale		1½
Coal		6
Shale		1
Coal		14
Shale		2
Coal		8+
Elevation	1146	

This coal is 136 feet above the creek and 130 feet above the Fossil limestone.

Three-fourths mile up the left fork the Young coal, opened by Rowland Rowe, shows:

Young Coal

	Feet	*Inches*
Sandstone	2	
Shale	1	
Soft coal		8
Block coal		32
Cannel coal		2
Elevation	1080	

Two hundred yards further up the creek, at elevation 1075, Marlan Back has the Young coal opened.

Young Coal

	Feet	*Inches*
Soil		
Gray shale		6+
Block coal		46
Cannel coal		2
Elevation	1075	

On the opposite side of the creek another opening shows:

Young Coal

	Feet	*Inches*
Sandstone	5	
Gray shale	1	
Block coal	37	
Shale floor		
Elevation	1075	

One hundred feet above these openings the bloom of the Flag coal was found. This is possibly the coal Crandall (Bulletin 10, Ky. Geol. Sur.) mentions as occurring 90 feet above and having the following bed section:

	Feet	*Inches*
Roof, clay shale		
Coal		4
Bituminous slate		5
Coal		11
Shale		1½
Coal		22
Bituminous slate		1½
Coal		6
Coal and clay		1½
Sandstone		1½

Below in the creek bed at elevation 1005 is the fossiliferous limestone. The interval between this limestone and the Young coal here is massive sandstone. This shows quite a change in the Young coal from the split condition found on the right fork only about a mile to the northwest.

LEFT FORK OF MIDDLE FORK

One-eighth mile up, up a right drain, the Gun Creek coal has been dug from the branch at elevation 874. In the head of this drain the Fire Clay coal, at elevation 988, shows 8 inches coal and 3 inches flint fire clay.

Three-fourths mile up, 200 yards up the first right branch, are two caved openings into the Gun Creek coal on Crit Patrick's place, at elevation 883. Only 7½ inches of coal could be seen.

Three hundred yards farther up, at the mouth of the second right branch, the Gun Creek coal, opened by Monk Patrick, shows:

Gun Creek Coal

	Feet	*Inches*
Gray shale	15	
Bluish-black shale	4	
Coal		7
Shale		6
Coal		2
Shale		½
Coal		11
Shale		½
Coal		12
Elevation	878	

In the head of this second right branch the Whitesburg coal shows, in the branch at elevation 954, 2 feet of black fissile slate with 18 inches coal (reported) below:

One and one-fourth miles up Left fork, at the mouth of the third right branch, James D. Allen had the Gun Creek coal opened in several places, all of which were caved when visited. Crandall (Bull. 10, Ky. Geol. Sur.) gives the following section for this coal here:

Gun Creek Coal

	Feet	*Inches*
Shale		
Coal		7
Shale		3
Coal		10
Shale		5
Coal		12

The elevation of these openings is 875. The elevation of the top of a well drilled for oil at the mouth of the third right branch is 855 feet A. T. (Hendrick's well).

A section from the top of the ridge at the head of Garden branch, down the branch to Hendrick's P. O., shows:

Section

		Feet	*Inches*
Top of hill			
Sandstone		15	
Shale		5	
Shaly sandstone		5	
Coal			6
Shale		8	
Fire Clay coal	Coal 7"	Ele. 1016	
	Shale 2"		
	Flint fire clay 3"		
	Coal 8"		
	Shale 3"		
	Black bituminous shale 7"		
Shale		5	
Black bituminous shale			6
Shale		3	
8-inch coal ....Elevation		1008	
Shale and shaly sandstone		45	
Covered—Whitesburg coal should come in this interval		35	
Gray shale		10	
Coal in branch one-half way up. Soft-blue fissile shale above it. This is the Gun Creek coal Elevation		916	
Shaly sandstone		15	
Sandstone containing calcareous concretions		20	
Covered		35	
Creek level at mouth ....Elevation		946	

On the left just below the mouth of Mill branch the Gun Creek coal shows 23 inches coal with 10 inches shale partings at elevation 889. A general section on Mill branch shows:

Section

		Feet
Top of ridge	Elevation	1235
Massive sandstone		14
Covered		10
Massive sandstone		20
Covered		6
Bench	Elevation	1180
Massive sandstone		60
Covered		25
Coal bloom and bench	Elevation	1095
Covered		65
Shaly sandstone		20
Bloom of Fire Clay coal	Elevation	1010
Arenaceous shale		25
Covered		10
Coal bloom—Whitesburg coal (?)	Elevation	975
Fire clay		2
Covered		7
Massive sandstone		20
Shaly sandstone		10
Covered		14
Shale		6
4-inch coal	Elevation	920
Shaly sandstone		18
Foot of hill		
Massive sandstone		22
Shale and sandstone—covered in part		22
Covered		8
Mouth of creek	Elevation	850

One-fourth mile up the branch above, where the road goes over the ridge into Flint branch, the Whitesburg coal has been taken from the branch at elevation 965. No measurements could be made. Probably not over 18 inches coal.

Seven-eighths mile up Mill branch, up a large right branch 200 yards, on the left, the Fire Clay coal, opened by Bruce Arnett, shows:

Fire Clay Coal

	Feet	Inches
Sandstone	4	
Shale		4
Coal		7
Bone coal		3
Flint fire clay		2½
Black bituminous shale		7+
Water		
Elevation	1015	

Two miles up Left fork, on the right by his house, Jeff Arnett has an opening into the Gun Creek coal.

Gun Creek Coal

	Feet	Inches
Shale	7	
Coal		6½
Shale		4½
Coal		3
Shale		1
Coal		8
Shale		4½
Coal		14
Shale		
Elevation	888	

Up a left branch on the opposite side of the creek from the above opening another opening into the same coal, on Jane Patrick's place, shows:

Gun Creek Coal

	Feet	Inches
Light-gray shale	8	
Blue shale	4	
Coal		5
Shale		5½
Coal		3
Shale		1
Coal		8½
Shale		5
Coal		15
Elevation	888	

Two and one-half miles up the creek, on the left, opposite the point where the road starts over the ridge to the Right fork, the Gun Creek coal, opened by Sam Patton, shows:

Gun Creek Coal

	Feet	Inches
Shale	5	
Splint coal		5
Shale		4
Coal		2½
Shale		1
Splint coal		9
Shale		1½
Coal		12
Elevation	888	

A section up the hill, along the road over the ridge to Right fork, shows:

Section

		Feet
Top of hill	Elevation	1208
Strong coal bloom—Hazard coal	Elevation	1206
Covered		11
Massive sandstone		10
Covered		25
Massive sandstone		54
Covered		36
Coal bloom	Elevation	1068
Massive sandstone		36
Coal bloom—Haddix coal (?)	Elevation	1032
Covered		12
Coal stain—Hamlin coal	Elevation	1020
Massive sandstone		32
Bloom of Fire Clay coal	Elevation	988
Covered		12
Arenaceous shale		25
Bloom of Whitesburg coal	Elevation	951
Shale		7
Shale, sandy toward top		53
Bloom of Gun Creek coal	Elevation	891
Foot of hill	Elevation	883

One-fourth mile above the point where the road goes up the hill over the Right fork Leslie Arnett has an opening into the Gun Creek coal, which shows:

Gun Creek Coal

	Feet	Inches
Shale	15	
Coal		6
Shale		5½
Cannel coal		9
Shale		8
Coal		9½
Shale		½
Coal		12
Elevation	898	

One-half mile above the point where the road goes up the hill over to Right fork, up a right branch ½ mile, the Fire Clay coal opened by Phillip Arnett shows:

Fire Clay Coal

	Inches
Massive sandstone	
Cannel coal	8
Flint fire clay	3
Cannel coal	14
Shale	4+
Coal	?

Water prevented measuring the entire thickness.

One and three-eighths miles above Mill branch, on the left at the mouth of a long left branch, the Gun Creek coal, opened by Larkin Arnett, shows:

Gun Creek Coal

	Feet	Inches
Shale	10	
Coal		6
Shale		6
Coal		2
Shale		6
Coal		11
Shale		2
Coal		10
Elevation	890	

One hundred yards upstream and 110 feet above this opening the Fire Clay coal is opened to show:

Fire Clay Coal

	Feet	Inches
Sandstone	10	
Shale		7
Block coal		4
Semi-cannel coal		4
Flint fire clay		3½
Cannel coal		12
Shale floor		
Elevation	1000	

Three-eighths mile below the mouth of Bear branch, on the right, up a small drain, H. W. Arnett has the Fire Clay coal opened.

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Coal		8½
Flint fire clay		3
Coal		7½
Cannel coal		6½
Fire clay floor		
Elevation	1004	

One-half mile up a large right branch, ¼ mile below Bear branch, the Whitesburg coal in the bed of the branch at elevation 955 shows 11 inches coal with 2 feet of black fissile shale over it. Shale and shaly sandstone are found on up the branch for ½ mile, where at elevation 990 the bloom of the Fire Clay coal is found.

On the point opposite the branch discussed above the Fire Clay coal has been opened by J. L. Arnett and shows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	20	
Gray shale		12
Splint coal		9
Flint fire clay		2½
Splint coal		13½
Shale floor		
Elevation	1000	

Forty-five feet below is what seems to be a prospect into the Whitesburg coal.

BEAR BRANCH

Four miles up Left fork on left. Elevation of mouth, 880.

One mile up Bear branch and 200 yards up a large left branch an old prospect into the Whitesburg coal shows:

Whitesburg Coal

	Feet	Inches
Gray shale	5	
Blackish fissile shale	2	
Coal		10
Shale		½
Coal		3
Fire clay floor		
Elevation	945	

The section continued on the head of this branch shows:

Section

			Feet
Shale and shaly sandstone			40
Fire Clay coal	Massive sandstone		Elevation 985
	Flint fire clay	3"	
	Coal	1"	
	Shale	3"	
	Coal	5"	
Massive sandstone			40
Shaly sandstone			20
Coal stain—Haddix coal			Elevation 1045
Sandstone			55
Bench			Elevation 1100
Covered			90-100
Base of Puncheon Creek sandstone cliffs			Elevation 1200

One-fourth mile farther up the creek on the left the Whitesburg coal exposed 10 feet above the creek shows:

Whitesburg Coal

	Feet	Inches
Shale	6	
Black slate		18
Coal		12
Shale		½
Coal		3
Fire clay floor ... Elevation	945	

Three-eighths mile farther up this coal goes under drainage at elevation 952.

Two miles up Bear branch, on the right in front of a house, just below the point where the trail from Stinson creek joins the creek, the Fire Clay coal shows the following section:

Fire Clay Coal

	Feet	Inches
Sandstone		
Coal		6
Flint fire clay		3½
Coal		7
Arenaceous shale		2 to 6
Coal		9
Shale		2
Coal		7
Fire clay floor ... Elevation	985	

This coal goes under drainage 200 yards upstream at elevation 978. One-fourth mile farther up a 14-inch coal dug from the bed of the creek at elevation 1015 is the Haddix coal. One hundred and fifty yards above this point the Fossil limestone is found in the bed of the branch at elevation 1020. This limestone goes under drainage, but rises about as the creek does and reappears above drainage ¼ mile from the head of the creek at elevation 1065, at the foot of the hill where the trail from the Open fork of Oakley creek and head of Stinson creek comes down. The High Rock sandstones are unusually prominent on Bear branch, forming exceptionally beautiful cliffs.

One-half mile below the mouth of Boardtree fork and ⅜ mile up a right branch the Whitesburg coal, opened by Jim Arnett, shows:

Whitesburg Coal

	Feet	*Inches*
Gray shale	5	
Black fissile slate	2	
Splint coal		11½
Fire clay floor		
Elevation	950	

One-eighth mile farther up the branch the thin seams of coal which represent the Fire Clay coals are seen at elevation 990.

BOARDTREE FORK

Five and one-half miles up Left fork on left. Elevation of mouth, 900.

One-eighth mile up in the creek bed the Whitesburg coal shows:

Whitesburg Coal

	Feet	*Inches*
Shale	3	
Black fissile slate	2	
Splint coal		14
Fire clay	2	
Elevation	908	

One-fourth mile up, up the first left branch, the Fire Clay coal shows only 12½ inches coal, with 2½ inches flint fire clay, at elevation 970.

Three-fourths of a mile up Boardtree fork, ⅜ mile up the second left branch, the Fire Clay coal is found in the bed of the branch and shows 13-inch coal with 3 inches of flint fire clay parting, beneath massive sandstone, at elevation 967.

One and one-fourth miles up Boardtree fork at the mouth of the third left branch, at A. J. Arnett's house, the Fire Clay coal shows 8-inch coal under massive sandstone at elevation 930. One-half mile up this branch, on the right, is an old prospect into what is probably the Hazard coal at elevation 1180. This is on a wide, prominent bench with the High Rock sandstone forming cliffs above it.

One-eighth mile up the right fork of Boardtree fork the Fire Clay coal goes under drainage at elevation 935.

Three-eighth mile up the right fork, on the right, is the following section:

Section

	Feet	*Inches*
Sandstone	**4**	
6-inch coal ... Elevation	**973**	
Blue shale	**14**	
Black slate	**4**	
Coal		**6**
Shale		**5**
Coal		**1**
Shale		**1**
Coal		**1**
Shale		**6**
Coal		**3**
Shale	**5**	
Creek level ... Elevation	**950**	

The thin seams of coal are the Haddix coal.

One mile up the right fork, in the creek bed, the fossiliferous limestone is found at elevation 992. Above this, massive sandstone is in the creek bed for 3/8 of a mile. Up a right drain at this point a 16-inch bed of coal at elevation 1065 is an upper seam of the Young coal. This coal lies 125 feet below the base of the High Rock sandstone cliffs.

One-half mile farther up is a caved opening into a coal at 1065 with a 16-inch bed of coal showing 5 to 6 feet above. This is the 16-inch coal seen in the drain lower down. One-fourth mile farther up, in the head of the right fork of Boardtree, the Hazard coal has been dug out of the bed of the creek at elevation 1100. Its bed section is:

Hazard Coal	*Inches*
Soil	
Coal	36+
(Water in opening. Probably as much as 12 inches more of coal.)	

One-fourth mile up the left fork of Boardtree, on the right, the following section shows the Haddix coal badly split.

Haddix Coal	*Feet*	*Inches*
Shale	2	
Coal		9
Shale		10
Coal		1
Shale		1
Coal		7
Shale		1
Coal		1
Shale	8	
Coal		8
Shale	11	
Coal		4
Shale	3	
Coal		8
Creek level, elevation	945	

Three-fourth mile up the left fork of Boardtree fork the Fossil limestone is in the bed of the creek at elevation 1010, showing the same section as on the right fork.

Nearly in the head of the left fork the 16-inch bed of coal, which is the upper seam of the Young coal, was seen at elevation 1090. Twenty feet above this is a 6-inch bed of coal between massive sandstones. Covered on to head of the fork.

One-eighth mile up the right branch, opposite the mouth of Boardtree fork, the Whitesburg coal goes under drainage at elevation 918, showing 13 inches of coal beneath two feet of black fissile slate. One-eighth mile farther up the Fire Clay coal goes under drainage at elevation 950, showing only 7-inch coal.

One-half mile up the branch from its mouth, up a left drain, an old opening into a coal on John Arnett's place, at elevation 1100, was into the Young coal. Another caved opening farther up, almost in the head of this branch, was into the same bed. This is on Joe Arnett's place. A thin coal (8 to 14 inches) in the branch below this opening is the Haddix coal. Elevation, 1030.

CRAFTS FORK

Eight and one-half miles up Left fork. Elevation of mouth, 900.

One-eighth mile up on the right the Fire Clay coal showed the following section by natural exposure:

Fire Clay Coal

	Feet	Inches
Massive sandstone	15	
Coal		12
Shale		30
Coal		9
Shale	2	
Elevation	916	
(Four feet covered to stream level containing flint fire clay float.)		

One-half mile up Crane's Nest branch of Crafts fork, in the head of a right branch, is a caved opening into the Flag coal. The following section is reported:

Flag Coal

	Feet	Inches
Coal		20
Shale		10
Coal		18
Elevation	1180	

Three-fourths mile up Crane's Nest branch, up a right branch, a coal was dug from the branch at elevation 1050. This is the Young coal or a low split of it. In the head of Crane's Nest branch, where it forks, the Young coal where dug from the branch shows:

Young Coal

	Feet	Inches
Soil		
Coal		25
Elevation	1058	
Water in opening		

One-fourth mile above Crane's Nest branch, up a right branch ¾ mile, the Young coal is exposed in the branch and shows:

Young Coal

	Feet	Inches
Sandstone drift		
Coal		9
Shale		8
Coal		12+
Elevation	1065	
(Water and mud prevented complete measurement.)		

At the mouth of this branch a 14-inch coal under massive sandstone at elevation 910 is probably the Hamlin coal.

One and one-fourth miles up Crafts fork the following section on the right shows the Haddix coal:

	Feet	*Inches*
Massive sandstone	5	
Gray shale		10
Coal		16
Gray shale	4	
Black shale		3
Coal		8
Shale	2	
Creek level at	937	

The upper one of these coals goes under drainage 200 yards farther up, at elevation 955.

One and three-fourths miles up Crafts fork, ½ mile up the sixth left branch, the Fossil limestone is exposed in the bed of the branch at elevation 975.

One-fourth mile up the right fork of this branch the Hazard coal, opened on the right, shows:

Hazard Coal

	Feet	*Inches*
Shale	5	
Coal		11
Fire clay	1	
Sandstone	5	
Coal		31½
Elevation	1095	

A section made on this branch is given below:

Section

			Feet
High Rock sandstone			40
Coal stain, Flag Coal rider		Elevation	1170
Covered			75
Hazard coal—section shown above		Elevation	1095
Massive sandstone			32
Young coal	9-inch coal	Elevation	1063
	Shale		5
	14-inch coal	Elevation	1058
Shale—part covered			13
Coal taken from branch		Elevation	1045
Covered			70
Fossil limestone in bed of branch		Elevation	975

Two and three-fourths miles up Crafts fork the Fossil limestone goes under drainage at elevation 978. Several thin coals exposed along the creek below this point are at the Haddix horizon.

Three miles up Crafts fork, up the right fork ¼ mile and 200 yards up a right branch, the Young coal opened on the place of Louisa Minix shows:

Young Coal

	Feet	Inches
Shale	10	
Coal		30
Shale floor		
Elevation	1040	

Three-fourths of a mile up the right fork of Crafts fork, up a left branch ⅛ mile, the Whittaker coal shows 10-inch coal in the bed of the branch at elevation 1060. One hundred yards farther up the branch is a caved opening into the Hazard coal at elevation 1080, reported to be 48 inches of coal.

A section up the road at the head of the right fork shows:

Section

		Feet
Top of ridge	Elevation	1390
Covered		120
6-inch coal bloom	Elevation	1270
Covered		90
Lower 40 feet of this is massive sandstone which forms cliffs (High Rock sandstone).		
Level of base of cliffs	Elevation	1180
Covered		30
Foot of hill		

Up the left fork of Crafts fork ⅛ mile Labe Minix has opened the Hazard coal, which shows:

Hazard Coal

	Feet	Inches
Massive sandstone	12	
Splint coal		10
Shale		28
Coal		39
Shale floor		
Elevation	1110	

Up the left fork of Crafts fork ⅜ mile, on the left, the Young coal shows by natural exposure the following section:

Young Coal

	Feet	Inches
Sandstone	5	
Shale	10	
Coal		22
Shale	1	
Elevation	1050	

There is probably other coal below this.

Up the right branch at this point, on the place of Labe Minix, the Hazard coal in the bed of the branch, at elevation 1080, shows the following section:

Hazard Coal

	Feet	*Inches*
Sandstone	10	
Coal		11
Shale		21
Coal		33+
Elevation	1080	

Water in the opening prevented full measurement.

One-half mile up the left fork of Crafts fork, up a right branch, on D. H. Howard's place, the Hazard coal shows the following section:

Hazard Coal

	Feet	*Inches*
Coal		14
Shale		24
Coal		18+
Elevation	1090	
Water in entry		

Up the main left fork of Crafts fork John Howard has the same coal opened. It shows:

Hazard Coal

	Feet	*Inches*
Shale	4	
Cannel coal		2
Block coal		37
Sandstone floor		
Elevation	1100	

One-fourth mile farther up the branch another opening into the same coal shows:

Hazard Coal

	Feet	*Inches*
Massive sandstone	4	
Coal		13½
Shale	4	
Coal		30+
Elevation	1095	
Water in opening		

SPRUCE PINE FORK

Eight and one-half miles up Left fork of Middle Fork. **Elevation of mouth, 900.**

On the left, ¼ mile up, at Drice Kennard's, the Hazard coal shows:

Hazard Coal

	Feet	Inches
Sandstone drift		
Shale	1	
Coal		6
Shale	8	
Coal		40
Fire clay floor		
Elevation	1145	

A section here shows:

Section

		Feet
Base of "Eagle Rock" sandstone cliff	Elevation	1265
Covered		25
Prospect into the Fugate coal. Shows 30 inches of coal. Solid coal not reached, however	Elevation	1235
Covered		50
Opening into Flag coal just across ridge on Crane's Nest branch of Craft's fork	Elevation	1185
Covered		40
Opening into Hazard coal given above	Elevation	1145
Covered		45
Old opening into Young coal, reported to have shown about three feet of coal	Elevation	1100
Covered		160
Fire clay coal bloom	Elevation	940

HAUNTED LICK BRANCH OF SPRUCE PINE FORK

One and three-eighths miles up on left. Elevation of mouth, 944.

One-fourth mile up, what is evidently the Hamlin coal, goes under drainage at elevation 971, showing 12-inch coal beneath massive sandstone.

Five-eighths mile up Haunted Lick branch the Young coal is opened by Elbert Arnett and shows:

Young Coal

	Feet	Inches
Massive sandstone	15	
Coal		11
Covered	13	
Coal		30+
Elevation	1016	
Water in opening		

Forty-five feet above this opening the bloom of the Hazard coal was seen. Below the mouth of this branch blocks of the Fossil limestone were seen in the branch at elevation 976.

Three-fourths of a mile up Haunted Lick branch, on the left, the Young coal, opened by Miles Ray, shows:

Young Coal

	Feet	*Inches*
Sandstone	4	
Coal		11
Shale		½
Coal		26½
Shale floor		
Elevation	1016	

Two hundred yards farther up and up a left branch the same coal shows in the branch, where 40″+ of solid coal was measured.

One half mile farther up the coal shows 27″+ in the bed of the creek at elevation 1010. The Hazard and Flag coals would be low in the hill here and should be prospected.

One and one-half miles up Spruce Pine fork, up a right branch, the Haddix coal and Fossil limestone are seen at elevation 990 and 998 respectively, the Haddix coal measuring only 6 to 8 inches of coal. Up the next right branch, ¼ mile farther up the creek—where the road from Lick branch comes down—the following section was obtained:

Section

		Feet
Top of hill	Elevation	1250
Strong coal bloom—Hazard coal	Elevation	1145
Covered		65
Massive sandstone		58
Fossil limestone	Elevation	1017
Shaly sandstone		7
Sandstone		7
Blue shale		2
5-inch coal—Haddix coal	Elevation	995
Covered		30
Hamlin coal in bed of branch at its mouth. Shows 12-inch coal	Elevation	965

Two miles up Spruce Pine fork, on the right, at the mouth of a right branch, the following section shows two thin coals which are at the horizon of the Haddix coal:

Section

	Feet	Inches
Massive sandstone	5	
Coal .... Elevation	980	5
Shale	10	
Coal		3
Creek level .... Elevation	970	

One-half mile up this branch the Fossil limestone shows in the bed of the branch at 980. This limestone goes under drainage one-fourth mile up the main creek at elevation 985.

One mile above the mouth of Haunted Lick branch, up Spruce Pine fork, and up a left branch ¼ mile, the Young coal is in the bed of the branch at elevation 1055. It was reported to be 52 inches thick here. Below in the branch two 3-inch seams of coal are seen between massive sandstones.

Up a left branch ¼ mile farther up the Young coal, opened by Harris Barnett on the left, 15 feet above the branch, shows:

Young Coal

	Feet	Inches
Shaly sandstone	2	
Coal		40
Fire clay floor .... Elevation		1070

Three-eighths mile farther up and ½ mile from the head of Spruce Pine fork, up a left drain ⅛ mile, the Hazard coal opened by Louis Barnett shows:

Hazard Coal

	Feet	Inches
Massive sandstone	5	
Shale		4
Coal		3
Shale		5
Coal		3
Black bituminous shale		3
Coal		30+
Elevation	1115	
Mud and water in opening which was partly caved.		

Above this coal is 75 feet of massive sandstone with a 3-inch streak of coal 25 feet above the Hazard coal. A section below the opening shows:

Section	*Feet*	*Inches*
Massive sandstone	25	
14-inch coal—Whittaker coal		
Shaly sandstone	10	
Coal		12—16
Covered	15	
The Young coal probably comes in this interval.)		
Massive sandstone	15	
Mouth of branch . . . . . Elevation	1050	

The Hazard coal goes under drainage 50 yards below the foot of the hill where the road starts up. A section up this hill shows:

Section	*Feet*
Covered from top of hill to	1250
High Rock sandstone	40
Coal stain in fire clay (?) . . . . . Elevation	1210
Massive sandstone	40
8-inch coal bloom—Flag coal . . . . . Elevation	1170
Massive sandstone	45
Bloom of Hazard coal . . . . . Elevation	1125

A generalized section for the area drained by Spruce Pine, Crafts and Boardtree forks of the Left fork of Middle fork is given below:

Section	*Feet*
Covered from tops of ridges to cliff-forming sandstone.	
Massive, cliff-forming sandstone (Upper part of Puncheon Creek sandstone)	50
Covered	25
Fugate coal (30 inches thick where seen).	
Massive sandstone—High Rock sandstone	45
Flag coal	
Massive sandstone, shaly towards top	45
Hazard coal, 36 to 48 inches	
Massive sandstone	35
Thin coal	
Shale	6
Thin coal	
Shale	4
Young coal	
Interval, mostly shale with two or three thin coals, but sometimes massive sandstone	70
Fossil limestone	
Interval, shale or shaly sandstone, with one to four thin coals—Haddix coal	20
Sandstone	30
Hamlin coal—12 to 13 inches	
Massive sandstone	25 to 40
Fire Clay coal—split into several thin seams.	

LICKING RIVER

FROM MIDDLE FORK TO OAKLEY CREEK

No large streams join Licking river on the right between the mouth of Middle fork and the mouth of Oakley creek. Stinson creek is the largest tributary and empties 3¾ miles above Salyersville. The others with names are Gardner branch, 1½ miles below Salyersville; Auxier branch and Flint branch, 1 and 3 miles respectively above Salyersville, and Montgomery branch, 5½ miles above Salyersville.

The coals opened or exposed on these streams are, with a few exceptions, the Fire Clay and lower coals, including the Tom Cooper coal, which is the lowest above drainage. This is due largely to the fact that the hills are low over a considerable part of the area and the Fire Clay coal is at a high elevation. On the upper part of Stinson creek and on the head of Montgomery branch the higher coals have a good area, but over the remaining part of the area coals higher than the Haddix are either missing or found just below the tops of the ridges.

The strata exposed on these streams range from the massive cliff-forming sandstone coming above the Flag coal to 15 feet below the Tom Cooper coal. The former is seen on a high point just above the mouth of Middle fork, forming a cliff 80 feet high. It is also prominent toward the head of Stinson creek and Montgomery branch.

None of the coals above the Fire Clay coal were seen opened or exposed where a bed section could be made, they showing only as blooms in the road where stratigraphic sections were made. The Fire Clay coal where observed was less than 32 inches thick. It is well above drainage over the whole area, going under drainage only in the head of the different streams and at about an average elevation of 1,000 feet A. T. Openings into it were fairly numerous, it being the coal used for local purposes. On Gardner branch, Auxier branch, Flint branch and Road fork of Stinson creek the interval between the Fire Clay coal and the Tom Cooper coal consists of blue-gray shales with occasionally some shaly sandstone. This gives way to massive sandstone at the big bend in the river above Stinson creek, which cuts out the Whitesburg and Gun Creek coals. However, at the mouth of Montgomery branch these coals are again present and the strata between them are shaly sandstone and shale.

The Whitesburg coal, 40 to 50 feet below the Fire Clay coal, wherever present has the characteristic black slate roof. It has practically the same area as the Fire Clay coal, but was less than 20-inch coal where seen.

The Gun Creek coal, 95 to 100 feet below the Fire Clay coal, the smaller interval found on Montgomery branch, is above drainage on the lower part of the streams and along the river. It showed 28½-inch coal on Auxier branch, but where seen elsewhere was only 10 to 24 inch coal.

The Tom Cooper coal, 170 to 180 feet below the Fire Clay coal on the branches under discussion, is just above drainage from the mouth of Gardner branch, where it is a thin coal between two sandstones to a point about 1½ miles below the mouth of Montgomery branch. It was only a few inches (10 to 20 inches) thick where exposures were found.

GARDNER BRANCH

Elevation of mouth, 829.

At the mouth of Gardner branch the top of a massive sandstone shows 8 to 12 feet above the river. The Cooper coal should come just on top or imbedded in this sandstone. From the mouth to the forks and up each fork soft, blue-gray shales are very prominent. These come just below the Gun Creek coal, which lies under a massive sandstone ¾ of a mile below Salyersville, where the road comes down a point to the bridge across Licking river.

One-fourth of a mile up the left fork of Gardner branch, 200 yards up a long right branch, the Gun Creek coal has been dug from the bed of the branch at elevation 906. One-fourth mile up this branch and up a right drain the Fire Clay coal shows by natural exposure the following section:

Fire Clay Coal

	Feet	Inches
Massive sandstone	15	
Coal		6½
Bone coal		3
Flint fire clay		2
Coal		1—2+
Elevation	1020	

Probably a little more coal below.

Blocks of black bituminous shale were found in the soil 5 feet below this exposure. This comes 4 or 5 feet below the seam carrying the flint parting.

One-half mile up the right fork of Gardner branch, on the left, is a caved opening into the Gun Creek coal, at elevation 895. The coal could not be measured.

A section down the hill from the top of the ridge, where the road from the head of Gardner branch goes over into Middle fork, joining it one mile below the forks, shows:

Section

		Feet
Top of hill	Elevation	1142
Covered		92
Slight coal stain—Hamlin coal	Elevation	1050
Covered		10
Massive sandstone		30
Bloom of Fire Clay coal	Elevation	1010
Shaly sandstone		20
Coal stain	Elevation	990
Shaly sandstone		8
Covered to opening into Gun Creek coal described above.		

With the Fire Clay coal at such a high elevation in the hills and none of the coals below it of any thickness, the prospects of coal on Gardner branch are poor, unless some of the coals below drainage prove of value.

In the bed of the river, 1 mile below Salyersville where it makes a very sharp turn, is a thin coal, no doubt the Tom Cooper coal.

AUXIER BRANCH

One-fourth mile up Auxier branch, on the left, a prospect into the Gun Creek coal on the Widow May's land shows:

Gun Creek Coal

	Feet	*Inches*
Gray shale	10	
Coal		7
Gray shale	4½	
Coal		10
Shale		5½
Coal		11
Elevation	894	

Two hundred yards farther up the branch, up a little right drain, the Fire Clay coal has been faced up on the Martin heirs' place at elevation 1018, and shows:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	20	
Coal		5
Flint fire clay		2—3
Cannel slate		5
Coal		3
Shale floor		
Elevation	1018	

One-half mile below Lakeville, on the same side of the river, on a point between two little drains, the following section shows the Fire Clay coal and Fossil limestone:

Section

		Feet
Top of point	Elevation	1190
Massive, coarse-grained sandstone		20
Covered		85
Blocks of blue, fossiliferous limestone	Elevation	1085
Covered, shaly sandstone drift		50
Shaly sandstone		20
Massive sandstone		10
Covered		10
Bloom of Fire Clay coal	Elevation	995
Shaly sandstone		5
Sandstone		5
Coal bloom	Elevation	985
Shaly sandstone		28
Covered		14
Shaly sandstone		18
Covered		5
Shaly sandstone		20
Covered to river level at elevation		846

FLINT BRANCH

Elevation of mouth, 851.

One-fourth mile up Flint branch, on the right, the following section shows the Gun Creek coal:

Gun Creek Coal

	Feet	Inches
Shale	3	
Bluish-black shale		8
Coal—12½ inches ... Elevation	895	
Blue shale	25	
Stream level		

This coal goes under drainage ⅛ mile farther up the stream at elevation 891.

Seven-eighths mile up Flint branch, up the left fork ¼ of a mile, the Fire Clay coal is opened in two places by Will Flint, on the right above the last house:

(1) **Fire Clay Coal**

	Feet	Inches
Massive sandstone	5	
Coal		10
Flint fire clay		3
Coal		10
Black bituminous shale		3+
Elevation	995	

and 100 yards farther up, in the bed of the branch, it shows:

(2) **Fire Clay Coal**

	Feet	Inches
Soil		
Massive sandstone	3	
Shale		6
Coal		10
Flint fire clay		3
Coal		10
Black bituminous shale		6
Elevation	995	

Seventy-five yards below the forks of Flint branch, on the right, the following section shows the Whitesburg coal:

Whitesburg Coal

	Feet	Inches
Gray shale	6	
Black bituminous shale	1	
Coal		9
Shale		4
Coal		3
Fire clay ... Elevation	940	10
Shaly sandstone	15	

Up the right fork of Flint branch ¼ mile, on the left, the Fire Clay coal shows where opened 40 feet above the stream the following section:

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Shale		4
Coal		9
Black bituminous slate		2
Flint fire clay		4
Coal		6+
Elevation	980	
Water in entry		

STINSON CREEK

Elevation of mouth, 853.

In the bed of the branch, 200 yards up the Road fork of Stinson creek, the Tom Cooper coal or a split of that bed shows 8-inch coal beneath 6 feet of sandstone.

One hundred yards farther up, on the left up a drain, Boone Hoskins formerly had an opening into the Fire Clay coal at elevation 1045. Only a trace of the opening was seen. He, however, reported a "Whin" rock—Flint fire clay—parting to the coal.

One mile up Road fork to the foot of the hill and up a right branch ⅛ mile Mrs. J. Powers has two openings into the Fire Clay coal at elevation 1000, one of which could be measured and showed:

Fire Clay Coal

	Feet	Inches
Massive sandstone	15	
Semi-cannel coal		6
Flint fire clay		3½
Splint coal		9
Black bituminous shale, almost cannel coal		12
Elevation	1000	

A section up the hill along the road at the head of Road fork shows:

Section

			Feet
	Top of hill in road	Elevation	1195
	Massive sandstone		5
	Covered		10
	Shaly sandstone		5
Young coal	Coal bloom	Elevation	1175
	Sandstone (thick bedded)		10
	Coal bloom	Elevation	1165
	Shaly sandstone		10
	Massive sandstone		35
	Drift covered		35
	Shale		20
	Coal bloom—Haddix coal	Elevation	1065
	Shale and shaly sandstone		20
	Coal stain—Hamlin coal	Elevation	1045
	Massive sandstone		45
	Coal bloom—Fire Clay coal	Elevation	1000
	Shaly sandstone		36
	8-inch coal bloom—Whitesburg coal	Elevation	964
	Shaly sandstone		19
	Level at foot of hill	Elevation	945

The Tom Cooper coal, exposed just above Stinson creek on the river, is just above drainage for a distance of 1 mile up Stinson creek, but is covered by the drift and alluvium.

The Fire Clay coal is opened in the first right branch, 1 mile up Stinson creek, by John Arnett and shows:

Fire Clay Coal

	Feet	Inches
Sandstone	10	
Shale		12
Coal		9
Black bituminous shale		—1
Flint fire clay		3
Coal		12
Shale floor		
Elevation	1020	

One-eighth mile farther up this branch, 2 to 4 inches of coal between shales in the bed of the branch at elevation 920 is probably a thin seam above the Gun Creek coal. A section on this branch shows:

Section

		Feet
Covered to top of hill		
Massive sandstone		23
Covered		4
Massive sandstone		10
Covered		8
Massive, coarse-grained sandstone		30
Fire Clay coal	Elevation	1020
Covered		20
Gray shale		26
Black fissile shale		4
Whitesburg coal taken from branch	Elevation	970
Covered		15
Sandstone		33
Gray shale		2
2 to 4 inch coal	Elevation	920
Gray shale		10
Massive sandstone		40
Mouth of branch	Elevation	870

A generalized section for the second left branch, 2 miles up Stinson creek, showing the Whitesburg, Fire Clay and Haddix coals, is given below:

Section

		Feet
Covered to top of hill		
Massive sandstone		35
Coal bloom—Haddix coal	Elevation	1085
Fire clay		2
Massive sandstone		63

Fire Clay coal. Exposed on right of the road where it takes up the hill. Elevation 1020:

Fire Clay Coal

	Feet	Inches
Coal		7
Flint fire clay		6
Coal		11
Shale	2	
Coal		7
Shale	1	
Elevation	1020	
Soft, blue-gray shale, arenaceous toward top	47	
Black fissile slate	2	

Whitesburg coal. Dug from branch one-half mile up. Elevation 969. Shows:

Whitesburg Coal

	Feet	Inches
Black fissile slate	2	
Coal		12
Shale		5
Coal		7½
Shale below		
Elevation	969	
Bluish-gray shale, more or less arenaceous	51	
Elevation of creek at mouth of branch	918	

The following section showing the intervals of the various coals was made along the trail from a point two miles up Stinson creek over into the head of the right fork (Howard fork) of Montgomery branch:

Section

		Feet
Top of ridge	Elevation	1215
Covered		11
Heavy coal bloom—Hazard coal	Elevation	1204
Covered		54
Massive sandstone		15
Covered		35
Massive sandstone		53
Slight coal bloom—Haddix coal	Elevation	1047
Shaly sandstone		18
Coal stain—Hamlin coal	Elevation	1029
Shaly sandstone		6
Sandstone—drift covered		17
Bloom of the Fire Clay coal	Elevation	1006
Sandstone		13
Coal stain	Elevation	993
Covered		13
Coal stain	Elevation	980
Shale		25
Coal bloom—Whitesburg coal	Elevation	955
Covered		35
Creek level	Elevation	920

Two and one-half miles up Stinson creek and ⅜ mile up a right branch the Fire Clay coal is in the bed of the branch at elevation 990:

Fire Clay Coal

	Feet	Inches
Sandstone	5	
Coal		7
Flint fire clay		5
Coal		7+
Elevation	990	
Water in opening		

Two hundred yards above the mouth of this branch, on the left 10 feet above the creek, the Whitesburg shows the following section by natural exposure:

Whitesburg Coal

	Feet	Inches
Black fissile slate	4	
Coal .... Elevation	960	10—
Fire clay	2	
Sandstone	10	

This coal goes under drainage seventy-five yards farther up.

One-half mile farther up the Fire Clay coal shows under a ledge of sandstone.

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Splint coal		4
Black shale		2½
Flint fire clay		3
Coal		5
Elevation	990	

In the head of Stinson creek the massive cliff-forming sandstones coming above the Flag coal (Puncheon Creek and High Rock sandstones) are seen standing out in characteristic cliffs. The Flag, Hazard and Young coals have a good area toward the head of this creek.

A section down the hills, where the road leaves the river and goes up over the point at the big bend just above the mouth of Stinson creek, shows:

Section

		Feet
Top of point	Elevation	1061
Massive sandstone		14
Bloom of the Fire Clay coal on the left of the road at top of the hill	Elevation	1037
Shale		9
Shaly sandstone		23
Covered		6
Massive sandstone		50
Coal bloom	Elevation	945
Covered		2
Massive sandstone		70
Covered		5
Gray shale		4
Black fissile shale		4
Tom Cooper coal: Coal ......10″ Shale ....(?) reported Coal ....(?) reported	Elevation	860
Covered		6
River level	Elevation	854

This section shows the Gun Creek and probably the Whitesburg coals cut out by massive sandstones. If the Whitesburg is present its interval has decreased and it comes in the 6-foot covered interval 32 feet below the Fire Clay coal. The coal at 945 was seen also in the first right branch of Stinson creek (see section above). An illustration of how quickly sandstones and shales replace each other is furnished here. On Road fork and Flint branch and above the big bend in the river the strata below the Fire Clay coal consists of shale and shaly sandstone. This sudden change from shale to massive sandstone is probably responsible for the river making such a curve at this point, as it was easier for it to go around through the shale where least resisted, instead of cutting through the massive sandstone.

Up a right drain, ½ mile below Montgomery branch, are three caved openings into the Fire Clay coal at elevation 1010. The following section was obtained at one:

Fire Clay Coal

	Feet	Inches
Massive sandstone	4	
Coal		5½
Flint fire clay		4
Coal		13
Shale		10+
Elevation	1010	

On the point on the right of the mouth of Montgomery branch is a caved opening into the Fire Clay coal at elevation 1005.

MONTGOMERY BRANCH

Elevation of mouth, 862.

Montgomery branch forks a short distance up, the right fork being known as Howard fork. On the point at the forks of the creek is a caved opening into the Fire Clay coal at elevation 1000.

Up the Howard fork ¼ of a mile the Fire Clay coal is opened on the right at elevation 992 and shows:

Fire Clay Coal

	Feet	*Inches*
Sandstone	3	
Shale		8
Coal		11
Flint fire clay		3½
Coal		14½
Shale		5
Coal		5+
Elevation	1002	
Water in entry		

A section down the point below here shows:

Section

			Feet
Opening into Fire Clay coal		Elevation	1002
Covered			64
Shaly sandstone			21
Coal bloom		Elevation	917
Shale			23
Coal	Coal 12" Shale 10" Coal 8"	Gun Creek coal....Elevation	894
Shale			12
Creek level		Elevation	882

One mile up the Howard fork Bird Arnett has the Fire Clay coal opened on the right. The opening was partly caved when visited, but the following section was obtained:

Fire Clay Coal

	Feet	*Inches*
Sandstone	5	
Coal		7½
Flint fire clay		3
Coal		16
Shale		8½
Coal (reported 12")		2+
Elevation	1007	
Water in entry		

A section at the head of Howard fork shows:

Section

		Feet
Top of hill	Elevation	1215
Covered		98
Wide bench and coal bloom	Elevation	1117
Massive sandstone		45
Slight coal bloom—Haddix coal	Elevation	1072
Shaly sandstone		20
Coal bloom	Elevation	1052
Covered		5
Shaly sandstone		15
Massive sandstone		30
Fire Clay coal	Elevation	1002
Shaly sandstone		30
Covered		40
Foot of hill	Elevation	932

LEFT FORK OF MONTGOMERY BRANCH

Up the first left drain of Montgomery branch, heading up against a low gap over to Licking river, the following section was obtained:

Section

			Feet
Bloom of Fire Clay coal		Elevation	1000
Shaly sandstone			40
Whitesburg coal	6-inch coal	Elevation	960
	Shaly sandstone		10
	6-inch coal	Elevation	950
Sandstone			30
Shale			10
24-inch coal—Gun Creek coal		Elevation	910
Shale			5

Up the second right branch, ¾ mile up Montgomery branch, the Fire Clay coal is opened on the right and shows:

Fire Clay Coal

		Feet	Inches
Sandstone		6	
Coal			8
Black bituminous shale			4
Flint fire clay			3
Coal			9
Shale			2
Coal			10
Shale floor	Elevation	1000	

In the head of Montgomery branch, just above a saw mill, the following section shows the Whitesburg coal:

Section

		Feet
Shaly sandstone		4
9-inch coal	Elevation	945
Shaly sandstone		5
8-inch coal	Elevation	940
Arenaceous shale		22
Black fissile shale		3
10-inch coal in bed of the stream	Elevation	915

The black shale indicates the lower of these beds as the Whitesburg, but this would mean a greater dip than there seemed to be.

Three-eighths of a mile below the mouth of Oakley creek in a little drain an old opening into the Fire Clay coal showed:

Fire Clay Coal

	Feet	Inches
Sandstone	10	
Coal		8
Flint fire clay		5
Coal		6+
Elevation	998	

In a little drain just below the mouth of Oakley creek a partly caved wet opening into the Fire Clay coal on the place of John Arnett showed:

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Cannel coal		8
Flint fire clay		3
Coal		18+
Water		
Elevation	995	

On the point on the right of the mouth of this drain an opening into the Fire Clay coal on the place of J. G. Arnett shows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Semi-cannel coal		7
Bone coal		1½
Flint fire clay		1 to 3
Coal		23
Elevation	995	

OAKLEY CREEK

On the right of Licking river, 6 miles above Salyersville. Elevation of mouth, 866.

Oakley creek drains an area of approximately 11 square miles. The principal tributaries to the creek are: Open fork, ¾ mile up on the right; Sycamore branch, 2½ miles up on the left, and Bee Tree branch, 4 miles up on the right.

The strata on the creek dip upstream throughout its entire length, at the rate of about 20 feet to the mile, and lie on the north side of the Licking River syncline, the dip being toward the axis which passes to the south of the head of the creek. The lowest strata are therefore found at the mouth of the stream and are those just below the Gun Creek coal, which is found in the stream bed 150 yards up the creek. The highest strata found on the creek, as well as in the county, are found in the ridge at the head of the creek, which is also the dividing ridge between the Kentucky river waters and those of Licking river.

As a coal field Oakley creek is a promising one and is a continuation of the one at the head of Middle fork. The upstream dip brings the Young, Hazard, Flag and higher coals down to a low level in the hills with a large area underlain by these coals.

The openings into the high coals were, with one or two exceptions, into the Hazard coal, but the Flag and Young coals show from 3½ to 6 feet of coal on the Quicksand waters just over the ridge at the head of the creek, and it is not at all improbable that these coals are of good thickness on Oakley creek.

The highest coal in the county of which there is any evidence was found at the head of Bee Tree fork, near the top of the ridge. This coal is a cannel coal, the blocks of which were plentiful in the soil. It is 400 feet above the Hazard coal and is also higher than the Hindman coal. No attempt is made to correlate it with any previously described coal.

The next lower coal of which evidence was found on Oakley creek was the Fugate coal. This was reported to have been struck in digging a post hole on Bee Tree fork, and showed a thick coal, partly cannel.

The Flag coal was not found opened or exposed on the creek. It should be found about 30 to 40 feet below the base of the massive sandstone cliffs so prominent on the creek. Several openings into it were reported to have been made, showing a four-foot bed of coal. Openings across the ridge into this coal on the Quicksand waters show the coal to be of this thickness, and it no doubt has a similar thickness on Oakley creek. It certainly deserves investigation.

Ninety to 100 feet below the massive cliff-forming sandstone above the Flag coal is the Hazard coal. It is opened in enough places to show it to have an average thickness of 40 inches of good coal and is low in the hills on the upper half of the creek.

No exposures or bloom of the Whittaker coal were found on this creek. However, this does not disprove its existence.

The Young coal, 45 to 50 feet below the Hazard, was found opened only in one place and showed a reported thickness of 48 inches of coal with a 12-inch parting. Openings on the Quicksand waters just over the ridge at the head of the creek show this coal to be from 3 to 6 feet thick, and it is not unlikely that it maintains its thickness through the ridge onto Oakley creek.

With the Flag, Hazard and Young coals all present on the creek, it is a safe assumption that there are at least two workable coals with a large area.

Between the Young coal and the Fossil Limestone no coals were found, although very few exposures of the strata at this horizon were found. The Fossil Limestone is present and well developed. Below it are two thin coals within 25 feet of the limestone, the lower one sometimes as much as 18 inches in thickness. These two coals are correlated with the Haddix coal.

The Hamlin coal is 40 feet above the Fire Clay coal and about 15 to 20 feet below the lower of the two coals representing the Haddix coal.

Another thin coal 20 feet above the Fire Clay coal was seen at one place. This coal is no doubt the Fire Clay Rider.

The Fire Clay coal is 100 feet above drainage at the mouth of the creek, but the upstream dip takes it below drainage 3 miles up. It maintains a thickness of 30 to 36 inches from the mouth for a distance of 2 miles up the creek, but above this point the coal is split so badly by partings that it is of no value. The flint parting is present wherever the coal was found, although of a dark or black color in places.

None of the remaining coals above drainage on the creek are of workable thickness so far as known. Two thin coals less than 12 inches in thickness are found 24 feet and 32 feet below the Fire Clay coal and the Whitesburg 40 feet below that coal is less than 12 inches thick where seen. It goes under drainage about 2 miles up the creek.

The Gun Creek coal, 107 feet below the Fire Clay coal, is above drainage only a short distance up the creek. The thickness of this coal farther up the river would justify further investigation as to its thickness on this creek.

Of the coals lower than the Gun Creek coal and hence below drainage on Oakley creek, nothing is known. It is probable, however, that there are workable coals below drainage on this creek, but this can only be proven by core drilling.

A detailed description of the openings and exposures of coals on the creek follows.

The Gun Creek coal is in the bed of the creek ⅛ mile from its mouth, consisting of several thin coals in the soft gray shales. Its bed section as measured is:

Gun Creek Coal

	Feet	*Inches*
Arenaceous shale	10	
Coal and shale		5
Dark-blue shale		4
Coal		6
Light-gray shale		3½
Coal		7
Light-gray shale		9
Coal		15½+
Elevation	868	

One-half mile up the creek a 20-yard wet entry into the Fire Clay coal on J. B. Owen's place, shows it to have the following bed sections:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-colored clay		2
Coal		12½
Flint fire clay		3
Coal		18
Coal, reported		4
Elevation	968	

A thin coal less than one foot thick shows in the road 100 yards above Owen's house at elevation 985. It is evidently the Fire Clay Rider.

OPEN FORK OF OAKLEY CREEK

Three-fourths mile up on the right. On the left 200 yards up, on the Calloway Montgomery place, an entry into the Fire Clay coal shows it to have the following bed section.

Fire Clay Coal

	Feet	Inches
Massive sandstone	6	
Black bituminous shale		5
Flint fire clay		2
Coal		33
Elevation	931	

Another opening 100 yards farther up on the same side, gives the same bed section as the one given just above.

Three-fourths mile up the Open fork, the Whitesburg coal is exposed in the bed of the creek at elevation 890. Its bed section is as follows:

Whitesburg Coal

	Feet	Inches
Shaly sandstone		
Black fissile slate	1	
Coal		8
Shale		
Elevation	890	

One-half mile up a long right branch, ⅞ mile up the Open fork of Oakley, the Fire Clay coal shows in the bed of the branch at elevation 927. Its section is as follows:

Fire Clay Coal

	Feet	*Inches*
Sandstone	2	
Cannel coal		5
Dull, hard coal		2
Flint fire clay		2
Coal		9
Shale		7½
Coal		8
Black shale floor		
Elevation	927	

Two hundred yards up the branch above the exposure in the stream on Calloway Montgomery's place, a coal is opened on the left, at elevation 1070. This coal has the black bituminous shale (cannel slate) at the top of the bed section which is like the Hazard coal where seen on this creek, but its interval of only 140 feet to the Fire Clay coal is much too small, hence it is correlated with the Young coal.

Young Coal

	Feet	*Inches*
Massive sandstone	4	
Black bituminous shale		8
Coal		20
Coal, reported		4
Parting, reported		12
Coal, reported		24
Elevation	1070	

Farther up this branch, in the bed of the stream at elevation 975, a thin coal of the Haddix horizon shows:

Haddix Coal (?)

	Feet	*Inches*
Coal		6
Shale		8
Coal		6
Elevation	975	

On up the branch at elevation 992, another 7-inch seam of coal shows. It is probably a split of the Haddix bed.

One mile up Open fork, 100 yards above the mouth of the branch last discussed, the Fire Clay coal shows the following bed section just above stream level:

Fire Clay Coal

	Feet	Inches
Massive sandstone	4	
Coal		10
Flint fire clay		3
Coal		13
Shale	8	
Coal		13½
Elevation	925	

The flint parting is very dark and does not show its usual characteristics. This coal goes under drainage a short distance farther up.

One-half mile above this point the following section shows what is probably the Hamlin coal, the interval between it and the Fire Clay coal apparently decreased, due to the strong upstream dip.

Hamlin Coal (?)

	Feet	Inches
Sandstone		
Coal		5½
Shale		1
Coal		5½
Shale		2½
Coal		13
Elevation	948	

On main Oakley creek, just above the mouth of the Open fork, the Fire Clay coal shows the following bed section where opened:

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Shale		3
Coal		11½
Flint fire clay		2
Coal		21
Elevation	945	

This opening is on the place of J. B. Owen.

Three-fourths of a mile up Oakley creek above the Open fork, up a left branch, the following section shows several thin coals, including the Fire Clay coal:

Section

			Feet	Inches
Sandstone			10	
Hamlin coal	Coal• 13½" Clay 6 " Coal 1 "	Elevation	955	
Massive sandstone			35	
Coal bloom—Fire Clay coal		Elevation	920	
Sandstone			5	
Fire Clay coal	Coal 13 " Flint fire clay 2½" Coal 16½"	Elevation	915	
Shaly sandstone			6	
Covered			10	
Gray shale			8	
Black shale				3
Coal				9½
Clay				6
Shaly sandstone			9	
Coal			9	
Elevation			883	

At the head of this branch on Gold Jackson's place, an opening, partly caved, into the Fire Clay coal, shows the flint parting apparently missing.

Fire Clay Coal

	Feet	Inches
Shaly sandstone	8	
Shale	1	
Coal		6
Shale		4 to 5
Coal		18
Coal, reported		20

One and one-eighth miles up Oakley creek above the Open fork, up a left branch back of Asburg Salyer's house, he has an opening into the Fire Clay coal, the bed section of which is as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	5	
Shale		8
Coal		16
Flint fire clay		2½
Coal		9½
Clay shale		2½
Coal		9½
Elevation	910	

Farther up this branch, at elevation 950, a coal about 1½ feet in thickness shows in the stream. This is the Hamlin(?) coal.

One and three-eighths miles up Oakley creek above Open fork, at the mouth of a left branch, the Fire Clay coal shows the following section:

Fire Clay Coal

	Feet	Inches
Massive sandstone	5	
Shaly sandstone	10	
Coal		5½
Flint fire clay		2
Coal		10
Clay		3
Sandstone		8
Clay		5
Coal ....Elevation 904		9
Shaly sandstone	7	
Coal		10½
Shale		

The bloom of the Haddix coal shows at 955 above this exposure.

One and three-fourths miles above the Open fork, opposite the mouth of a left branch, the Fire Clay coal shows the following section:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Coal		6
Flint fire clay		2½
Coal		11½
Shale	3	
Coal ....Elevation 910		8
Covered interval	2	
Coal		6
Covered interval	3	
Coal		3½

At the mouth of Sycamore branch, 2½ miles up Oakley creek, the Fire Clay coal is at elevation 905 just above drainage. Its section is practically the same as shown just above.

SYCAMORE BRANCH

Two and one-half miles up Oakley creek. Elevation of mouth 900.

One-fourth mile up, on the right, the Hamlin coal shows by natural exposure.

Hamlin Coal

	Feet	Inches
Shale	3	
Coal		20
Shale		18+
Elevation	968	

One hundred yards farther up the branch, on the left, is a caved entry into the Hazard coal at 1095, on the place of Mr. Mann.

On up the branch a thin 4-inch coal at 974 and one at 990, 9½ inches thick, are probably the Haddix coal.

On Sarah Salyer's place at the head of the right fork, at elevation 1053, a coal was reported to have been opened and showed 4 feet of coal. This is the Young coal. Above this, at 1160, another was reported to have shown over 4 feet of coal. This is at the place of the Flag coal. The Fire Clay coal goes below drainage ⅛ mile above Sycamore branch at elevation 900.

BEE TREE FORK OF OAKLEY CREEK

Four miles up. Elevation of mouth 915.

On the left, at the mouth, Isaac Montgomery has an opening into the Hazard coal at elevation 1085, which was partly caved when visited. Its bed section as obtained is:

Hazard Coal

	Feet	Inches
Bituminous cannel shale		6
Coal		36
Shale		7
Coal		20
Elevation	1085	

Ninety feet above this opening the massive sandstone cliffs coming above the Flag coal are seen beautifully developed.

Below this opening and 200 yards up Bee Tree fork at elevation 925, a coal between the Fire Clay coal and Haddix (probably the Hamlin coal or a low split of the Haddix coal) shows just above the stream level.

Hamlin Coal (?)

	Feet	Inches
Shale	5	
Coal		1
Shale		7½
Coal		5½
Shale		9
Coal		11
Elevation	925	

Shale and covered to stream at 920.

One-half mile up Bee Tree fork, a 3-inch coal in the bed of the branch at elevation 970, probably represents the Haddix coal. A short distance up and at elevation 980, is an exposure of the Fossil Limestone.

One mile up Bee Tree, on the left, a caved opening on Wesley Rowe's place at elevation 1085, is into the Hazard coal. This bed is reported to be about 4 feet thick.

A coal was reported to have been struck in digging a post hole 136 feet above this opening. This coal is above the massive cliff-forming sandstone and is the Fugate coal.

One and one-half miles up Bee Tree fork of Oakley creek, in a right drain, a 12-yard entry into the Hazard coal on the place of Louis Minix, shows it to have the following bed section:

Hazard Coal

	Feet	Inches
Sandstone		
Bituminous cannel shale		4
Coal		26
Black shale		3
Light-gray shale		5
Coal		5
Coal, reported		7—10
Elevation	1090	

Up the left fork of Bee Tree fork, two openings into the Hazard coal on John Baily's place show the following bed section:

Hazard Coal

	Feet	Inches
Sandstone		
Bituminous cannel shale		4½
Coal		27
Hard, bituminous shale		4
Light-gray shale		7
Coal		4
Elevation	1095	

One hundred yards farther up is the second opening.

Hazard Coal

	Feet	Inches
Sandstone	2	
Impure cannel coal		2
Coal		25½
Gray shale		8
Coal		8
Elevation	1095	

A coal which would be the Flag coal was reported to have been seen 50 feet above this coal in a slip. Forty feet above this place is the base of a massive sandstone cliff.

On top of the ridge at the head of Bee Tree fork, a cannel coal bloom was found at elevation 1500—400 feet above the Hazard coal. This is undoubtedly the highest coal in the county.

Up a left branch, ¼ mile up the right fork of Oakley creek, a 50-yard entry into the Hazard coal shows the following section 8 yards in:

Hazard Coal

	Feet	Inches
Sandstone		
Shale		5
Bituminous cannel shale		5½
Coal		10
Shale		1½
Coal		30
Elevation	1065	

One mile up the right fork of Oakley creek the Fossil Limestone goes under drainage at elevation 950.

One-eighth of a mile up a right branch at the point where the limestone goes below drainage the Hazard coal is opened on Joseph Watson's place. Its bed section is as follows:

Hazard Coal

	Feet	*Inches*
Massive sandstone		
Coal		2
Shale		9
Coal		20
Shale		22
Coal		14
Shaly sandstone	6	
Coal		12
Arenaceous shale	8	
Bituminous cannel shale		4
Coal		33½
Shale		5½
Coal		7+
Elevation	1060	
Water in entry		

The upper part of the section was seen only by natural exposure, the entry being only into the coal below the bituminous shale.

One mile up the left fork of Oakley creek the Fossil Limestone goes below drainage at elevation 948.

One and one-half mile up the left fork of Oakley creek, on the left, a partly caved opening into the Hazard coal on Harrison Flint's place shows it with the following bed section:

Hazard Coal

	Feet	*Inches*
Massive sandstone	4	
Bituminous cannel shale		3
Coal		15
Shale		1
Coal		19
Elevation	1035	

There is probably more coal below which was not taken up in making the entry.

LICKING RIVER

ON THE RIGHT, FROM OAKLEY CREEK TO TRACE FORK

The strata above drainage in this region are those included between the Fire Clay coal and a horizon 600 feet above the Fire Clay coal. The highest coal bloom found is the bloom of the Hindman coal at the head of Half Mountain creek, 380 feet above the Fire Clay coal. Strata higher than this occur on the divide between Magoffin county and Breathitt county, which attain an elevation of over 1500 A. T. This high elevation and the low elevation of the Fire Clay coal (840 feet) permits the occurrence here of the highest strata found in the country.

The thickest coal found in this region is the Young coal on Bullmire creek. This coal here has a thickness of 68 inches of coal with 14 inches of parting. This thickness is exceptional, however, and cannot be expected to hold over any considerable area.

The most promising coal over the region as a whole is the Hazard coal, and the best coal area, as far as known, is at the head of Half Mountain creek. Here the Hazard coal ranges in thickness from 25″ to 42″+ with an average thickness of 35 inches and only 2 to 3 inches of parting. At the head of Half Mountain creek the coals lower than the Young coal are below drainage and the Young coal is too badly split to be of economic importance. The Hazard is of workable thickness and the Flag coal has workable area in the upper portion of Half Mountain, and the latter should be well worth prospecting here, as it has a good thickness, hurt, however, by bad partings less than a mile across the county line in Breathitt county. Over the rest of this area, outside of Half Mountain creek, all the coals—Hazard, Flag and Fire Clay—are too badly split to be of economic importance except locally as, for example, the Young coal on Bullmire creek and the Hamlin coal on Licking river just below the mouth of Dutton. It is possible that the Young and Hazard coals may reach a workable thickness at times in the region between Bullmire creek to and including Buck branch, but so far as seen these coals are either too badly split or too thin to be of value.

The beds between the Hazard and the Fire Clay coals in some portions of this area are split into thin beds scattered through the entire interval, with less than 20 feet between them.

To the southeast the beds are not as badly split and many of these thin beds apparently come together to form the thick Young coal of the upper Licking coal field.

THE HINDMAN COAL

Nothing is known of the thickness of this coal in this area. The Hindman coal is found as a bloom at the forks of Half Mountain creek. The interval to the Fire Clay coal is here 380 feet and to the Flag coal 110 feet. This bed with its possible excellent thickness should be well worth developing under the high divide between Magoffin and Breathitt counties, at the head of Half Mountain creek. It would be found here at an elevation of between 1200 and 1230, while the divide attains a height of over 1,500 feet.

FUGATE COAL

The bloom of the Fugate coal is found at the forks of Half Mountain creek, just at the base of the Puncheon Creek sandstone and 40 to 50 feet above the place of the Flag coal. Nothing is known of the thickness of the Fugate bed in this region, but it is probably thin. It is not known to have a thickness of over 2 feet in the adjoining portions of Breathitt county. The Fugate coal does not appear to be a persistent coal in the area under consideration.

THE FLAG COAL.

The bloom of the Flag coal is found in a section made on the left fork of Half Mountain creek and on Buck branch, but this coal is nowhere exposed for measurement in this region. It is, however, a thick coal in Breathitt county and on Puncheon creek, though badly parted in both these districts.

This coal deserves prospecting in this region, as owing to the general southwest dip it will have a fairly good area, especially near the Breathitt county border. It is of workable thickness on Trace fork and not badly injured by partings and may be expected to be workable throughout much of the area between Buck creek and Trace fork.

Although the total area of this coal is small owing to the high elevation of the Flag coal (generally between 1100 to 1160 feet), local areas should be sufficient to make this coal of economic importance where the character of the bed section is good.

The Flag coal is everywhere above drainage in this region and will be found in the hills where they rise to any considerable height. The Flag-Fire Clay coal interval varies from 275 to 285 feet, with an average of 280 feet. It has an interval of approximately 50 feet to the Fugate coal and a variable interval of 40 to 70 feet to the Hazard coal, this latter interval being usually about 60 feet. This variation of the Hazard-Flag interval is due in a large part to the splitting up of the Hazard bed and the consequent difficulty of determining the true horizon of that coal.

THE HAZARD COAL

The Hazard coal is frequently opened in this region, openings into this bed being especially abundant in the southwestern part. From the evidence which the exposures afford the Hazard coal has a maximum thickness of 42″+ of solid coal on Equal fork of Half Mountain creek and has a thickness of over 30 inches, only on Half Mountain creek. Above Half Mountain creek the bed is usually split and thin, with a maximum thickness of about 27 inches. The Hazard coal has generally from 2 to 11 inches of cannel slate at or near the top of the bed.

The interval between the Hazard and Fire Clay coals varies from 190 to 220 feet with an average of about 200 feet. The interval from the Hazard coal to the Young coal ranges from 50 to 70 feet, averaging probably 55+ feet.

The Hazard coal comes 70 to 100 feet below the base of the High Rock sandstone with an average interval of 85 feet. The Hazard coal is everywhere above drainage in this area and is always to be found in the hills except where they are exceptionally low.

THE YOUNG COAL

The Young coal is usually very badly split throughout this area. In one place, near the head of Bullmire creek, the bed is thick, but it is not probable that it maintains this thickness in that locality for more than a few hundred acres at most.

The Young coal is above drainage throughout this region, except at the head of Half Mountain creek. It has excellent area in this district. The Young-Fire Clay coal interval is 140 to 155 feet with an average of 150 feet. The Young coal at times has a few inches of cannel slate immediately over the coal, but this is not nearly as frequently present as it is in the Hazard coal.

TRACE FORK COAL

This bed is of no economic importance in this district. The bloom of this coal, apparently thin, is found in several places, e. g. on Buck branch and on a small right branch between Half Mountain creek and Dutton creek. It comes 10 to 20 feet over the fossiliferous limestone and 100 to 110 feet over the Fire Clay coal.

FOSSIL LIMESTONE

The limestone has been found at a number of points and it is probably present throughout a good part of the area, though undoubtedly lacking in some portions of the region. In several places continuous exposures for some distance above and below the horizon of this bed showed it to be absent.

At the mouth of Bullmire creek the interval of the Fossil Limestone to the Fire Clay coal is 87 feet.

THE HADDIX COAL

The Haddix coal is very thin in this region. It has never been found with a thickness of over 3 inches. A coal at times attaining a workable thickness occurs quite persistently in this area 3 to 30 feet over the Fire Clay coal. This coal is correlated with the Hamlin coal. The Haddix coal is found 10 to 20 feet under the fossiliferous limestone and 66 to 76 feet over the Fire Clay coal.

THE HAMLIN COAL

The Hamlin coal is frequently exposed in this region, naturally as well as by openings. In only one place (about 1 mile above the mouth of Half Mountain creek, on the right bank of the river) is the bed of workable thickness. At this point it shows 33½ inches of coal with 3 inches of shale parting. Elsewhere the maximum thickness of this bed is 20 inches. The average thickness is about 16 inches of coal. The Hamlin coal usually has a poor roof consisting of clay shale and sandy shale, which is inclined to cave. On Bullmire creek the Hamlin coal is split. The Hamlin-Fire Clay coal interval is 30 to 40 feet.

This bed is below drainage throughout much of this area. It goes below drainage 1¼ to 1½ miles up Half Mountain creek and about one-half mile up Bullmire creek. On Buck creek it is below drainage over all but the portion near the mouth.

THE FIRE CLAY RIDER

The Fire Clay Rider is exposed on Half Mountain creek near the mouth and also near the mouth of Bullmire creek. This coal has a maximum observed thickness in this region of 25 inches of coal with ½ inch of shale parting. Over this seam of coal, with a shale interval of 10 feet is an upper seam of coal 19″+ thick. This exposure is on the third right branch of Half Mountain creek. At the mouth of Bullmire creek this coal is 10 inches thick with 4 inches of shale. The Fire Clay Rider will probably not be found of workable thickness in this region. It has a small exposed area, being below drainage over much of the area. The interval to the Fire Clay coal varies from 16 to 23 feet.

THE FIRE CLAY COAL

The Fire Clay coal has a poor thickness in this region. It is generally thin, with less than 25 inches of coal, and is very badly parted. It has a maximum thickness of 32 inches of coal with 3 inches of flint fire clay on the first right branch of Half Mountain creek, this being the only exposure where the bed shows workable thickness in this region.

The exposed area of the Fire Clay coal is small in this region, as it is under drainage everywhere except over a roughly triangular area bounded on the south and southwest by a line drawn from 1 mile up Half Mountain creek to the mouth of Bullmire creek and bounded on the east by Licking river and northwest by Oakley creek.

The Fire Clay coal may be of workable thickness throughout much of that portion of this area lying between Half Mountain and Oakley creek, but elsewhere in this region is not known to be of economic importance. No coals below a low split of the Fire Clay coal are above drainage in this area.

COALS BELOW DRAINAGE

The Whitesburg coal is probably not of workable thickness under this area.

The Gun Creek coal shows a good thickness of 36½ inches of coal, with some parting, in the bed of Licking river just below the mouth of Half Mountain creek, and it may be of workable thickness over much of this area. No such statement can be made with assurance, however, on account of the lack of evidence and on account of the changeable character of this bed.

DETAILED DESCRIPTION

One and three-fourths miles above the mouth of Oakley creek is a small right branch known as Howard branch. The Fire Clay coal has been opened by Cal Howard one-third mile up that branch, on a right drain. Reported section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone, thin Bedded at base	4	
Block coal		1½
Shale		5
Cannel slate		7
Light-gray shale		6
Block coal		10
Flint fire clay		3
Splint and block coal		17+
Elevation	958	
An 80-foot wet entry		

The flint fire clay here shows plant impressions.

One hundred and fifty feet beyond this opening, on the right, a low split of the Fire Clay coal shows as follows in natural exposure:

Low Split of the Fire Clay Coal

	Feet	Inches
Dark-gray shale		
Block coal		7½
Light-gray clay shale		
Elevation	940	

Two caved openings show into the Fire Clay coal on the river bank at the mouth of A. Howard branch, on the right.

HALF MOUNTAIN CREEK

Elevation of mouth, 884.

At the mouth of this creek, at river level on the left of the road, a 4½-foot bed of massive, hard, light-gray, muscovitic sandstone shows at elevation 885.

Two hundred yards up Half Mountain creek, on the left of the road, a low split of the Fire Clay coal shows:

Low Split of Fire Clay Coal

	Feet	Inches
Block coal		10
Elevation	913	

Six hundred yards up High Mountain creek, on the left, the following section shows on the land of Farmer Holliday:

Section

	Feet
Top of coarse-grained, massive sandstone. The sandstone is yellowish and friable............Elevation	1324
Massive sandstone—the lower 25 feet in cliff with nearly vertical faces	159
Covered interval	30
Completely caved prospect—Hazard coal......Elevation	1135
Covered interval	66
Coal bloom with cannel shale—Young coal.....Elevation	1069
Approximate place of Fire Clay coal..........Elevation	928

It is probable that the lower ledge of massive sandstone mentioned above as 25 feet thick is the small sandstone ledge which lies over the Hazard coal and between the Hazard coal and the base of the High Rock sandstone. The interval to the Fire Clay coal of 236 feet is much too low for this ledge to be the High Rock sandstone.

One-half mile up Half Mountain branch, one-fourth mile up the first right branch on the right, Elsberry Stacey has a 50-foot entry into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Block coal		16
Flint fire clay		3
Splint coal		16
Elevation	927	
Interval shaly sandstone	5	
Block coal—a low split of the Fire Clay coal		11

One-half mile up this branch the Fire Clay Rider shows in natural exposure on the right of the branch. The bed section is:

Fire Clay Rider

	Feet	Inches
Covered		
Block coal		16
Shale interval	6	
Block coal		7
Shale		8
Block coal		14
Elevation	942	

The upper seam of coal is probably not more than 2 to 3 inches thicker than given above.

One mile up Half Mountain creek and 100 yards above the mouth of the second right branch of the creek the Fire Clay coal shows in natural exposure on the left of the road. The bed section is as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone, shaly at base		
Block coal		14½
Cannel slate		2¼
Flint fire clay		3
Splint coal		12½
Clay shale floor		
Elevation	906	

Plants imprints show in the flint fire clay parting here.

One and one-fourth miles up the creek, on the left of the road opposite the third right branch, the Fire Clay coal shows in natural exposure:

Fire Clay Coal

	Feet	Inches
Massive sandstone showing cross-bedding at the base		
Splint coal		8
Cannel slate		6¾
Shale	2	
Splint coal		13
Flint fire clay		3
Coal		¼
Shale floor		
Elevation	906	

The Fire Clay Coal Rider has been prospected 300 yards up the third right branch of Half Mountain creek on the left of the branch. The bed section is as follows:

Fire Clay Rider

	Feet	Inches
Shaly sandstone		
Block coal		19
Shaly sandstone and covered	10	
Splint coal		24½
Shale		½
Coal		½
Shale floor		
Elevation	924	

One and one-half miles up Half Mountain creek, on the left of the road, the Fire Clay coal and a low split of this bed show in natural exposure as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Cannel slate		10
Shale		18
Block coal		8½
Black slatey shale		3
Flint fire clay		3
Shale		17
Interval—largely shale	5	
Block coal		8
Elevation	900	

Two miles up Half Mountain creek is a right-hand branch which heads toward Bullmire creek. Elevation of mouth, 914. Two hundred yards up this branch a thin coal shows at natural exposure, which is probably the Hamlin coal:

Hamlin Coal

	Feet	Inches
Shale		
Coal		5
Shale floor		
Elevation	925	

One-half mile up this branch a thin, parted coal bed shows in natural exposure at the horizon of the Trace Fork coal:

Trace Fork Coal

	Feet	Inches
Massive sandstone	18	
Block coal		1
Shale		18
Block coal		3
Elevation	975	

Three-fourths of a mile up this branch is an old prospect, now completely caved, into the Young coal at elevation 1010. Ths coal was reported 2½ feet thick. The roof of this bed is thin-bedded sandstone underlain by light-gray, sandy shale.

Three and one-fourth miles up the main creek is a branch on the right which is the first right-hand branch below the mouth of Equal forks. One-half mile up this branch, on the left, is an opening into the Hazard coal by Frank Miller. A partial section is:

Hazard Coal

	Feet	Inches
Light-gray, thin-bedded sandstone	1	
Dark-gray shale	4	
Cannel slate		6
Coal		28¼+
Elevation	1032	

The lower 6½ inches of this coal was in water and the coal may be as much as 10 inches thicker. The coal is of good quality block and splint mixed.

Three-fourths of a mile up this branch a high split of the Young coal shows in natural exposure on the left of the branch. The bed section is:

High Split of the Young Coal

	Feet	Inches
Massive sandstone	3	
Coal		5
Light-gray, sandy shale	11	
Coal	9	
Shale		3
Coal		7½
Dark bituminous shale		8
Light-gray shale		88
Coal		12+
Elevation	990	

One mile up this branch a low split of the Hazard coal shows in natural exposure as follows:

Low Split of Hazard Coal

	Feet	Inches
Shale		
Block coal		4
Shale	5½	
Block coal		10
Elevation	1014	

This bed of coal comes 18 to 20 feet below the Hazard bed.

The Hazard coal has been opened in a 40-foot entry, on the land of the Mike Rowe heirs on the left fork of this branch, 25 feet above the branch and 1⅛ miles up the branch. The bed section here is:

Hazard Coal

	Feet	Inches
Light-gray, massive sandstone	4	
Cannel slate		4½
Block coal		9
Cannel slate		2
Splint coal		6
Bone coal		½
Splint coal		10
Shale floor		
Elevation	1034	

HALF MOUNTAIN CREEK FORK, 3½ MILES UP: The right fork is known as Equal fork. Two hundred yards up this right fork, on the left, the following section was made:

Section

		Feet
Coal bloom and spring on bench		
Hindman coal	Elevation	1242
Covered interval		60
Coal bloom—Fugate coal	Elevation	1182
Covered interval		107
Coal bloom and bench—Flag coal	Elevation	1075
Place of Fire Clay coal beneath drainage	Elevation	840

One-half mile up Equal fork, at the forks, a high split of the Young coal, coming about 10 feet over the horizon of the Young coal, shows in natural exposure as follows:

High Split of the Young Coal

	Feet	*Inches*
Block coal		4
Shale		6
Block coal		4
Interval	3	
Block coal		15
Interval	4	
Block coal		3
Elevation	970	

The Hazard coal has been opened by Will Conley one-half mile up the right fork of Equal fork. The bed section is:

Hazard Coal

	Feet	*Inches*
Massive sandstone	2	
Light-gray shale		5
Black cannel slate		0—1
Block coal		16

One-eighth mile up a small right branch of the right fork of Equal fork the Hazard coal shows as follows:

Hazard Coal

	Feet	*Inches*
Shaly sandstone	1	
Thin-bedded sandstone	2	
Cannel slate		2½
Block coal		26
Interval	5	
Block coal		7
Interval	5	
Block coal		6
Interval	4	
Block coal		8

The Hazard coal is opened in a 4-yard entry by Thomas A. Conley, ⅛ mile up the first left branch of the left fork of Equal fork. A partially caved opening gives the following partial section:

Hazard Coal

	Feet	Inches
Shale	3	
Massive sandstone		4
Shale		5
Cannel slate		4
Coal		42+
Shale		1
Splint coal		16
Shale		2
Splint coal		4½
Shale floor		
Elevation	1023	

The coal of this opening appears to be of excellent quality.

The Hazard coal has again been opened, in a 5-yard entry, by Will Conley 200 feet above the above-mentioned opening, on the right. The bed section here is:

Hazard Coal

	Feet	Inches
Massive sandstone	2	
Light-gray shale		7
Cannel slate		2½
Block coal		14
Shale		2
Block coal		15½
Shale		1
Coal with much hard, dull coal		5½
Shale floor		
Elevation	1020	

This coal was reported to be 4 feet thick.

On the right of this branch, about opposite this prospect, on the land of Thomas Conley, a coal bloom with cannel slate was found at elevation 1065, 40 feet above the Hazard coal. This is the bloom of the Flag coal.

A coal coming between the Hazard and the Young coals and about 30 feet below the Hazard coal has been prospected by Daniel Joseph in a small left branch of the left fork of Half Mountain creek, one-sixth mile above the mouth of Equal fork. The bed section is:

	Feet	*Inches*
Sandy shale		
Block coal		5½
Shale		2
Block coal		11½
Covered interval, largely shale	16	
Block coal		15
Shale		½
Block coal		6½
Elevation	994	

Two hundred yards up a small right branch, ¼ mile up the left fork of Half Mountain creek, a bed corresponding to the upper one of the two preceding beds shows in natural exposure. This bed section is:

	Feet	*Inches*
Shale		
Coal		3
Shale		½
Coal		8
Shale floor		
Elevation	1008	

Five-eighths mile up this left fork of Half Mountain is a large left branch. The following section was obtained on this branch:

		Feet
Bench	Elevation	1174
Covered interval		46
Massive sandstone forming ledges		16
Covered interval		30
Heavy coal float—Flag coal	Elevation	1082
Covered interval		40
Heavy coal bloom, thickness 71½ inches—Hazard coal, elevation		1042
Covered interval		52
Young coal	Shale Block coal 17½" Shale 14" Block coal 9"	Elevation 990

The following section was obtained on the right fork of the left fork of Half Mountain:

Section

	Feet	Inches
Massive sandstone	20	
Coal bloom with cannel slate—Hazard coal. . Ele.	1035	
Covered interval	50	
Coal		2 to 3
Interval	5	
Young coal { Shale Block coal . . . . . 6½"+ } Elevation	980	

One-fourth of a mile up the left fork of Half Mountain creek a 9-inch coal bed shows between shales at elevation 1020. This is a low split of the Hazard bed.

The Hamlin coal has been opened by Joe Allen 1 mile above the mouth of Half Mountain creek on the eastern side of a point just above the mouth of Puncheon creek. The bed section is:

Hamlin Coal

	Feet	Inches
Shale with small ferruginous concretions	8	
Block coal		2½
Block coal with considerable hard, dull coal		4½
Shale		10
Block coal		11
Shale		3
Block coal		22½
Shale floor		
Elevation	963	

The roof of this bed is poor. Above this opening a pronounced bench shows at elevation 1040. This is the bench of the Young coal.

Two hundred yards up the river, on the same side, a coal bed shows in natural exposure as follows:

Split of Fire Clay Coal

	Feet	Inches
Shale		
Block coal		12
Interval	6	
Block coal		5
Elevation	922	

One-third of a mile below the mouth of Dutton branch is a small tributary to Licking river on the right. At the mouth of this branch, on the right, the Fire Clay coal has been opened. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	30	
Splint coal		10
Cannel slate		4
Flint fire clay		2½
Cannel slate		3
Block coal		8
Elevation	929	

One-third of a mile up this branch at the forks the Hamlin coal shows in natural exposure as follows:

Hamlin Coal

	Feet	Inches
Light gray, sandy shale	3	
Block coal		17
Shale floor		
Elevation	960	

The following section shows at this point:

Section

	Feet
Massive cliff-forming sandstone	
Covered interval	
Bench	
Covered interval	100
Bench	
Covered interval	5
Coal bloom and cannel slate, Trace Fork coal...Elevation	1050
Covered interval, largely shaly sandstone	80
Coal bloom, Hamlin coal	970
Interval containing 25 feet of massive sandstone	31
Coal bloom, fire clay coal...Elevation	939

One-fifth mile above this branch, on the left of a small right drain between this branch and the mouth of Dutton creek, Mary Howard has a 3-yard entry into the Hamlin coal. The bed section is:

Hamlin Coal

	Feet	Inches
Sandstone	3	
Thin bedded, shaly sandstone	2	
Light gray, soft, sandy shale	1	
Block and splint coal		20
Shale floor		
Elevation		955

The roof of this bed is poor.

One-third of a mile up Licking river is a large right branch known as Dutton creek. The Fire Clay coal has been opened at the mouth of this creek on the right. The bed section is as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Light gray, soft shale	4	
Splint coal		9
Cannel slate		5
Flint fire clay		1½
Cannel slate		1¾
Light gray, soft, clay shale		½
Cannel slate		1½
Splint coal		7
Shale floor		
Elevation	909	

One-fourth mile up Dutton creek a high split of the Fire Clay coal shows in natural exposure on the right of the road:

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Light-gray, sandy shale	1½	
Block coal		10
Shale		1
Block coal		5
Shale floor		
Elevation	906	

This appears to be a high split of the Fire Clay coal. The bed carrying the flint fire clay is below the upper split.

A low split of the Hamlin coal shows 100 yards farther up the creek and one-third mile up Dutton creek, on the right:

Hamlin Coal (Low Split)

	Feet	Inches
Shaly sandstone		
Block coal		6½
Elevation	926	

About 160 yards above this point a prospect by John Arnett into the Hamlin coal gives:

Hamlin Coal

	Feet	*Inches*
Shaly sandstone	10	
Block coal		1
Shale		2
Block coal		2½
Bone coal		1½
Block coal		12
Shale floor		
Elevation	930	

One hundred yards upstream from this prospect and 10 feet below it a low split of the Hamlin coal gives the following bed section in natural exposure:

Low Split of the Hamlin Coal

	Feet	*Inches*
Shaly sandstone		
Light gray, sandy shale	5	
Block coal		8
Shale		7
Block coal		7
Shale floor		
Elevation	920	

The Haddix coal shows in natural exposure at creek level 1¼ miles above the mouth. The bed section follows:

Haddix Coal

	Feet	*Inches*
Hard, white, shaly sandstone with plant imprints		6
Sandy shale		5
Block coal		3
Shale roof		
Elevation	960	

Two hundred and fifty yards above this point the Fossil limestone shows in the bed of the stream at elevation 970. The limestone here is in two beds, three feet apart and separated by shale. A section here is:

Section

	Feet	*Inches*
Coal bloom and bench, Young coal....Elevation	1045	
Light, gray, sandy shale and shaly sandstone....	25	
Massive sandstone	25	
Covered interval	20	
Fossiliferous limestone	1	
Dark gray, soft shale	3	
Fossiliferous limestone with crinoid fragments..		3

Six hundred yards below the mouth of Bullmire creek, on the right of the river, a traverse up a hillside gave coal blooms at the following elevations:

Section

		Feet
Coal bloom, Whittaker coal	Elevation	1079
Covered interval		80
Bench		
Covered interval		30
Coal bloom, Haddix coal	Elevation	969

BULLMIRE CREEK

Elevation of mouth, 904.

The Fire Clay Rider shows in natural exposure at the mouth of Bullmire creek on the right. The bed section is:

Fire Clay Rider

	Feet	Inches
Sandstone	6	
Shale		
Block coal		6
Shale		4
Block coal		4
Elevation	920	

The upper portion of the Fire Clay coal bed shows at the mouth of Bullmire branch at river level on the left. A partial section here is as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	2½	
Light gray, sandy shale		6
Block coal		3+
Elevation	904	

The lower part of this bed is below river level and could not be measured.

The Fossil limestone shows on the left of Bullmire creek 100 yards up at elevation 990.

RIGHT BRANCH OF BULLMIRE CREEK

Two hundred yards up this branch, on the left of the stream, is a prospect into the Hamlin coal. The bed section is:

Hamlin Coal

	Feet	*Inches*
Light gray, sandy shale	7	
Block coal with ¼-inch seam of pyrite		6½
Shale		3
Coal (the upper ⅓ has much hard, dull coal, the lower ⅔ is splint coal)		6½
Shale floor		
Elevation	940	

Three hundred yards up the branch, on the left, a prospect shows a high split of the Hamlin coal. The bed section is:

High Split of Hamlin Coal

	Feet	*Inches*
Light-gray, sandy shale	6	
Splint coal		17
Soft, gray shale floor		
Elevation	955	

One hundred yards farther up the branch, on the right at stream level, the Haddix coal shows:

Haddix Coal

	Feet	*Inches*
Shale		
Block coal		3
Shale		
Elevation	967	

The following section was obtained on this branch from this point to ¼ mile up the left fork of this branch:

Section

	Feet
Bench and reported coal bloom 5 feet thick—Flag coal, elevation	1138
Covered interval	83
Bench and coal bloom—Young coal . . . . Elevation	1055
Covered interval	45
Massive sandstone	22
Shaly sandstone with some soft, gray shale	20
Coal, 3 inches—Haddix coal . . . . Elevation	968

The place of the fossiliferous limestone is somewhere between the base of the massive sandstone 22 feet thick and the coal at elevation 968. Its probable elevation is about 978.

The Hamlin coal shows in natural exposure ¼ of a mile up Bullmire creek on the left. The bed section is:

Hamlin Coal	Feet	Inches
Shaly sandstone		
Block coal		8½
Shale floor		
Elevation	937	

Five-eighths mile up Bullmire, on the left, a coal bloom and prominent bench show at elevation 1026. This is the bloom of the Young coal. The Young coal has been opened in a 22-yard entry by Bird Howard, 2 miles up Bullmire on the left. The bed section is:

Young Coal	Feet	Inches
Shaly sandstone	8	
Light-gray clay shale		4
Block coal		18
Shale		9½
Block coal		2
Shale		3
Block coal		1
Shale		1½
Block coal		18
Block and splint coal		29
Shale floor		
Elevation	1025	

This is a promising exposure, the lowest bench of coal is of especially good quality. It is questionable, however, whether this bed has any considerable area at this thickness, and extensive prospecting should be done to determine whether it holds this thickness. It appears that a number of thin beds—splits of the Young coal in the adjoining territory—have been united to make a bed of good thickness here. The bed is here low in the hills and should have good area. The coal is said to separate easily from the partings.

One hundred and thirty yards upstream from the above-mentioned opening, on the right, the Whittaker coal is prospected by J. B. Owens. The bed section is:

Whittaker Coal	Feet	Inches
Bluish-gray, sandy shale	1½	
Block coal		3
Shale		6
Block coal		17½
Shale floor		
Elevation	1051	

The lower seam of this bed was said to be excellent shop coal. This bed is 26 to 28 feet above the Bird Howard opening mentioned above.

BUCK CREEK

Elevation of mouth, 916.

RIGHT FORK OF BUCK CREEK

Elevation of mouth, 918.

The Hazard coal has been opened in a 5-yard entry by Proe Wireman, ¾ mile up the Right fork and 300 yards up a left branch. The bed section is:

Hazard Coal

	Feet	*Inches*
Massive sandstone	4	
Cannel slate		2
Splint and block coal		23
Shale floor		
Elevation	1075	

One mile up the fork the bloom of the Young coal shows in a right branch. One and three-fourths miles up the fork, 100 yards below the fork at the head ,the following section of the Young coal shows:

Young Coal

	Feet	*Inches*
Shaly sandstone		
Block coal		17½
Shale	11	
Block coal		8
Shale	5	
Block coal		21
Shale		16
Block coal		19
Shale floor		16+
Elevation	1015	

The Hazard coal has been opened in a 30-yard entry by J. M. Owens on the right fork of this fork. The bed section is:

Hazard Coal

	Feet	*Inches*
Massive sandstone	5	
Shaly sandstone	5	
Cannel slate		11
Block coal		21
Shale		2½
Block coal		4
Shale floor		
Elevation	1065	

Ninety feet over this bed is the base of the massive, cliff-forming High Rock sandstone. Between this coal opening and the base of the cliff is a slight bench, undoubtedly the bench of the Flag coal.

One-half mile up Buck branch is a branch on the left known as Card fork. The elevation of the mouth is 923. The following section was obtained on this fork:

Section

		Feet
Massive cliff-forming sandstone		30
Covered interval		75
Bench		
Covered interval		15
Massive sandstone		50
Shaly sandstone		20
Massive sandstone		30
Shale		7
Base of section and mouth of Card fork	Elevation	923

A section on Buck branch, between Card fork and Pound branch, is as follows:

Section

		Feet
Prominent bench (Flag)	Elevation	1108
Covered interval		68
Bench (Hazard)		
Covered interval		57
Massive sandstone		20
Coal streaks cross-bedded in the base of massive sandstone—Trace Fork coal	Elevation	963
Covered interval		8
Bench		
Covered interval, upper limit of limestone float, 2 feet, elevation		953

The Whittaker coal has been opened in a 30-foot entry by Ellet Wireman, 200 yards above the mouth of Pound branch in a right hollow. The bed section is:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	5	
Shale		1½
Block coal		18
Shale		4
Splint coal		3½
Shale floor		
Elevation	1045	

The following section shows above this opening:

Section

		Feet
Top of sandstone	Elevation	1203
High rock sandstone		50
Covered interval		
Coal bloom, 2+ feet thick, shows cannel coal or cannel slate—Flag coal	Elevation	1112
Covered interval		67
Coal opening—Whittaker coal	Elevation	1045

One and three-fourths miles up Buck branch, on the main or left fork, the Young coal has been opened by S. Bailey:

Young Coal

	Feet	Inches
Massive sandstone	6	
Splint coal		3½
Block coal		11
Block and splint coal mixed		15½
Elevation	1047	

A 4-foot coal bed was reported to occur 20 feet above this bed. A 1½-foot bloom was found here.

Two and one-half miles up main Buck creek the Flag coal has been prospected. Eleven inches of cannel coal show in this prospect. The prospect was caved and this cannel coal is only the lower part of the bed. The elevation of the opening is 1150:

LICKING RIVER ABOVE TRACE FORK AND GRASSY CREEK

In this region seven coals are at times of workable thickness. These are in order of their economic importance: The Whittaker, Young, Flag, Fugate, Hazard, Trace Fork and the Fire Clay coals.

The latter four coals are relatively unimportant. The Fugate coal has little area and is badly parted, though frequently thick. The Hazard coal is generally thin, only occasionally reaching workable thickness, as on portions of Trace fork. The Trace Fork coal has at best only a few hundred acres of workable thickness. The Fire Clay coal is below drainage over all but a small portion of the area and is probably not of workable thickness over most of the territory it underlies.

The Whittaker coal attains a maximum thickness of 65 to 70 inches of workable coal and rarely falls below 30 inches recoverable coal.

The Young coal has a maximum thickness of 50 inches on Bull creek. Comparatively little is known of its thickness over much of the area. It should be prospected, as it would add considerable value to the areas where the Whittaker coal is a commercially valuable coal.

The Whittaker coal is thickest in the area drained by Bull creek and that part of this region lying on each side of Licking river as far as the mouths of Salt Lick fork and Road fork. Above Salt Lick fork and Road fork the Whittaker coal becomes so badly split as to probably not be a commercially valuable coal over the larger part of the area. In places, however, it may be found workable and should be worth prospecting.

HINDMAN COAL

The bloom of the Hindman coal should be found wherever the hills rise above 1,380 feet in parts of the region where the Whittaker coal has an elevation of 1,160 to 1,170 feet. The Hindman bed will be found to be within a short distance of the top of the upper of two massive cliff-forming sandstone ledges which lie over the Flag coal. The lower one of these cliff-forming sandstones, the High Rock sandstone, lies within 20 to 30 feet of the Flag coal, but at times is inconspicuous and loses its cliff-forming characteristics. The Hindman bed, because of its great height above drainage and very small area, will not be of any interest from an economic standpoint.

PUNCHEON CREEK SANDSTONE

This sandstone is the upper one of the two cliff-forming sandstones which closely resemble each other and which come within a distance of 120 feet over the Flag coal. Whenever the hills rise to sufficient height this sandstone may be seen standing out in gray, fungus-covered cliffs, which are unique in that they weather into pitted and ribbed, irregular surfaces and on disintegration form a dry, mealy, sandy soil.

The lower similar ledge, the High Rock sandstone, lies closely over the Flag coal and below the Fugate coal. It frequently happens that the first cliff-forming sandstone with the characteristics common to the High Rock and Puncheon Creek sandstone is the upper of these two ledges, the High Rock sandstone being thin and not conspicuous over a large part of this territory.

The Puncheon Creek sandstone has an interval to the Fire Clay coal of 317 to 360 feet with an average interval of 328 feet.

The High Rock sandstone has an interval of 270 to 295 feet to the Fire Clay coal with an average of 285 feet. The Fugate coal lies above the High Rock sandstone and the Flag coal 15 to 20 feet below it.

FUGATE COAL

This coal has been opened twice in this region. Once on Trace fork and again at the head of Straight fork. The bed here shows 51½ inches of coal with 19½ inches of parting. At the head of Straight fork the Fugate coal shows 46 inches of coal with 4 inches shale parting. The Fugate-Fire Clay coal interval is 296 feet on Trace fork and 292 feet at the head of Straight fork.

The Fugate coal has but small area in this region, though probably of workable thickness over much of the area which it underlies. It will probably be found to average 48 to 50 inches of coal with 6 to 12 inches of shale parting. The Fugate-Flag interval is from 40 to 46 feet.

FLAG COAL

The Flag coal has only been opened once in this district. An opening into this coal on Licking river above the mouth of Grassy creek and below the mouth of Salt Lick fork showed 35 inches of coal with 2½ inches of bone coal. The bloom of the Flag coal has been found in a number of places. The Flag coal will have but little area in this region. Nothing is known of the thickness of this bed except as given above. The Flag coal lies within 30 feet of the base of the High Rock sandstone, the interval being usually 16 to 20 feet. The Fire Clay coal-Flag coal interval varies from 250 to 268 feet.

LENVILLE ROWE COAL

A coal bed lying 22 to 26 feet below the Flag coal has been opened at several points and the bloom of this bed has been quite often found. It has been opened twice on Trace fork, but could only be seen on Minix fork. Here it showed 51 inches of coal with 6 inches of shale parting.

Cannel coal was reported from a bed at the horizon of this bed in the lower part of Trace fork. This is a bed lying between the Hazard and the Flag coals. Where opened it comes 72 feet below the base of the High Rock sandstone. It has an average interval to the Fire Clay coal of 226 feet.

THE HAZARD COAL

The Hazard coal on Trace fork comes 18 to 26 feet over the Whittaker coal. This coal has been opened on Rye branch of Trace fork, where it was reported to be 48 inches thick with 6 inches parting. A caved opening in this coal on Batelick branch was reported to be 3½ feet thick. On the Right fork of Trace fork this bed has been opened and shows a thickness of 25¾ inches. There is no doubt that this coal is distinct from the Whittaker coal.

The interval of this bed to the Fire Clay coal is 190 to 200 feet. Locally on Trace fork it may be workable, but will not be a commercially valuable coal over the greater part of the region. It is everywhere above drainage and will have fairly good area—practically the same area as the Whittaker coal.

WHITTAKER COAL

This is a persistent coal throughout the region and is the thick coal bed of the upper Licking river coal field. It varies in thickness in the district under discussion from a maximum thickness of 65 inches of solid coal on Bull creek to a minimum thickness of 17 inches, with 1-inch parting, at the extreme head of Licking river. It will probably be found to average 40 to 42 inches over the large part of the region. The bed becomes badly split above the mouth of Road fork and Salt Lick fork at the head of Licking river, and in this district, though a paucity of openings makes a positive statement unwise, it is probably not of workable thickness.

In this district the bed will be found best developed in the triangular shaped area bounded by Licking river on the east, by Trace fork on the northwest and by a line drawn from Waldo postoffice on Trace fork to the mouth of Straight fork. The bed is also of fairly good thickness on the left of Licking river between the mouth of Grassy creek and the mouth of Straight fork.

Outside of these areas the bed will be found frequently of workable thickness, but it is within these boundaries, and especially in the area drained by Bull creek and in the region between Bull creek and Licking river, that the bed will be found thickest.

The Whittaker coal has usually the following roof:

	Feet	*Inches*
Shaly sandstone grading to thin-bedded sandstone above		
Block coal		10 to 14
Light-gray, sandy shale	5 to 10	
Soft, gray fissile shale	1+	
Main coal		

The thin bed shortly above the main bed is very frequently found and often aids in the identification of the bed.

The Whittaker coal has an interval to the Fire Clay coal of 165 to 190 feet, the common interval being 175 feet. The interval between this coal and the next lower coal, the Young coal, is 25 to 30 feet. The interval of this coal to the Flag coal is 70 feet on the average.

The Hazard coal of the region between Half Mountain creek and Trace fork has an interval of 210 feet to the Fire Clay coal and 70 feet to the Young coal. In that region there is a coal which comes between the Young and the Hazard coals and with a small interval to the Young coal which correlates with the Whittaker coal.

The Whittaker coal is everywhere above drainage in this region, and though pretty well up on the hills has fairly good area. The area here treated, taken in conjunction with the area on the left of Licking river between Howard branch and Grassy creek, makes a good coal field.

THE YOUNG COAL

The Young coal has a maximum thickness of 50 inches of solid coal on Bull creek and a minimum thickness of 17½ inches at the head of Trace fork. Over much of Trace fork this bed is of workable thickness, though at times it is split. So far as the evidence indicates the Young coal may be expected to have a thickness of 34 to 38 inches over much of Trace fork. On Bull creek, with the exception of some apparently thin beds at this horizon, the bed is of good thickness where opened at two points. One opening on Bull creek shows this coal 50 inches thick, and in another it is 34″+ in thickness. The Young coal deserves prospecting in this region and should add very materially to the value of the area in which the Whittaker coal is of good thickness.

The Young coal is everywhere above drainage and has good area throughout this region. The interval of the Young coal to the Whittaker coal is approximately 30 feet and this coal has an interval to the Fire Clay coal of 142 to 154 feet.

With only rare exceptions the Young coal is the first workable coal over the Fossil limestone. At one point on Trace fork (Batelick branch) a coal—the Trace Fork coal—coming over 30 feet below the Young coal and about midway here between the horizon of the Young coal and the Fossil limestone, shows 18″+ of coal, the bed being reported to be 3½ feet thick. The Trace Fork coal is, however, usually less than 15 inches thick and is generally within 20 feet of the Fossil limestone and therefore will not be confused with the Young coal.

TRACE FORK COAL

The Trace Fork coal, so far as is known, will not be of any economic importance in this region, although it is a fairly persistent bed. It has a maximum thickness of 18″+ (reported 3½ feet) on Batelick branch of Trace fork and has a minimum observed thickness of 7 inches. Undoubtedly, at times, the coal of the bed is entirely lacking, the place of the bed being marked only by coal streaks cross-bedded in the base of a massive sandstone which commonly lies close over the bed.

FOSSIL LIMESTONE

The Fossil limestone is well developed over this district as a whole. It is absent, however, at times. This is apparently the case on Alum Cave branch of Road fork. The soft, gray, calcareous shale which underlies the limestone is usually present throughout this district.

The limestone appears generally in two beds separated by shale, but at times the lower bed appears to be lacking. The hard, dark, blue-gray limestone of the upper bed contains abundant brachiopodal fossil remains, chiefly of the genus Productus. In one instance, on Batelick branch of Trace fork, small trilobites, apparently two distinct species, were found in this bed. Small ostracods and fragments of crinoid stems, the latter being of several species, also occur as well as in the soft fissile calcareous shales which underlie the bed.

On Batelick branch an impure, dark, blue-gray limestone about 10 inches thick was found with an interval of 16 feet, largely shale, to the upper limestone. It is characterized by concave weathering and by having instead of marine fossils fresh water molluscs.

HADDIX COAL

The Haddix coal has a maximum thickness in this region of 37 inches of coal and 19 inches of parting or, in the same exposure, on the lower seam 34 inches of coal and 5 inches of shale. It has this bed section on Batelick branch of Trace fork. This coal has a minimum observed thickness of 2 inches on Bee Tree branch. It is possible that this bed was a split of the main bed, but no evidence of such being the case was found.

On Bull creek this bed nearly attains workable thickness, being found with 32½ inches of coal and 9 inches of parting. Generally speaking the Haddix coal will not be of commercial importance in this region at the present time. It is above drainage over most of the area. It goes under drainage at the head of Road fork and is below drainage in the upper portion of Bull creek. It goes under drainage on Straight fork a short distance below the forks of Straight fork. The Haddix-Fire Clay interval is 62 to 75 feet.

HAMLIN COAL

This coal, so far as is known, never attains workable thickness in this region. The maximum thickness is 28½ inches with 2 inches of shale parting, in an opening just above the mouth of Grassy creek. The minimum thickness of this bed is 14 inches of coal with 16 inches of shale parting on Spruce Pine branch of Salt Lick fork. The average thickness of the bed is probably 18 inches.

The Hamlin coal is best developed from just below the mouth of Grassy creek to the head of Licking river, running just about at river level for a considerable distance. It is below drainage on Trace fork and continues below until near the mouth of Bull creek. Here it is brought above drainage by the pronounced rise of strata at the head of Licking river and continues above until about half-way up Straight, Road and Salt Lick forks.

The interval of this coal to the Fire Clay coal is 37 to 50 feet. It is not as thick or as badly split a bed as is the Haddix. It generally has a massive sandstone roof and the top of the massive sandstone over the Fire Clay coal is but a short distance below it.

FIRE CLAY RIDER

This bed, as well as the Fire Clay coal, is below drainage over most of this region. It shows a maximum thickness of 35 inches, with ¼-inch shale parting one-third mile above the mouth of Grassy creek, and a minimum thickness of 4 inches on Alum Cave branch of Road fork. It is possible, however, that the 35-inch bed is a high split of the Fire Clay coal instead of the Fire Clay Rider. The bed will not average more than 8 to 9 inches in thickness and is of no economic importance. It rises above drainage just below the mouth of Grassy creek and continues above drainage for a short distance up Straight, Road and Salt Lick forks. The interval of the Fire Clay Rider to the Fire Clay coal is small here, varying from 8 to 16 feet.

FIRE CLAY COAL

The Fire Clay coal is below drainage everywhere in this district except for a few hundred acres about the mouth of Grassy creek. It is just at river level at the mouth of Grassy creek and the top of the bed is but 2 to 3 feet below the water level at the mouth of Straight fork. Between the mouth of Grassy and the mouth of Straight fork it probably lies less than 5 feet below river level. The Fire Clay coal at the mouth of Grassy has 36 to 41 inches of recoverable coal. At the mouth of Straight fork the bed is reported to have 30 inches of coal with 3 inches of parting. From the scanty evidence here given the Fire Clay coal would have an average thickness of 32 inches in the area under consideration.

The coal is always within 80 feet of drainage except for a small area at the extreme head of Trace fork and its branches and of Road fork, but is usually much less than this distance below drainage. It could therefore be easily reached by shafts and deserves testing with a core drill, as it may add greatly to the value of this region as a potential coal field.

TRACE FORK

Elevation of mouth, 925.

The Whittaker coal has been opened by John T. Wireman in a 30-yard wet entry, 700 yards up Wadkins branch (the first right branch of Trace fork) on a right drain. The bed section is as follows:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	2	
Light-gray, sandy shales	4	
Block coal		11
Light-gray shale		5
Block coal		1
Light-gray clay shale	5	
Block coal		22+
Elevation	1050	

This bed has an interval of 176 feet to the Fire Clay coal.

In a number of places elsewhere on Trace fork, a bed with an interval to the Fire Clay coal varying between 124 and 146 feet and with an average interval of 143 feet has been opened. This latter coal comes at the horizon of the Young coal of Buck, Half Mountain and Oakley creeks. The Whittaker coal given above, comes about 30 feet over the Young coal and between the Young coal and the place of the Hazard coal, and has been opened at a number of points on Trace fork. The interval of this coal to the Fire Clay coal varies between 170 and 190 feet. This variation is probably largely due to the bed being split and measurements consequently giving intervals to the different splits. This coal (called here the Whittaker coal) correlates with the coal found 28 to 30 feet over the Young coal on Bullmire creek.

One mile up Trace fork is a right branch known as Morgan's branch. At the mouth of this branch, on the right, a heavy bloom of cannel coal was reported to have been encountered in digging a grave at elevation 1105. This was the bloom of the Flag coal.

The Trace Fork coal shows in natural exposure 1/4 mile up Morgan's branch in the bed of the stream. The bed section is:

Trace Fork Coal

	Feet	*Inches*
Thin-bedded sandstone	2	
Block coal		7
Elevation	953	

About one mile up Morgan's branch, near the head, the Whittaker coal has been opened on the land of the heirs of Morgan Wireman. The bed section is:

Whittaker Coal

	Feet	*Inches*
Light-gray, sandy shale	5	
Block coal		49
Elevation	1040	

This coal is of excellent quality, the lower 2 feet of the bed being reported to be good quality shop coal.

One hundred and eighty yards downstream from this opening, an opening into this coal, now completely caved, was reported to have coal 4½ feet thick. The following section was obtained here:

Section

	Feet	*Inches*
Light-gray shaly sandstone		
Dark-gray fissile shale	1	
Block coal		5
Shale		1
Block coal........Elevation 1040		10
Shale interval	10	
Block coal		12
Shale interval	6	
Young coal........Elevation 1023		

BONE BRANCH

One and one-fourth miles in a straight line from the mouth of Trace fork is the mouth of a left branch known as Bone branch.

The Fossil limestone shows in natural exposures 250 yards up Bone branch, on the left, at elevation 971.

The Young coal is opened in a 15-yard entry, 750 yards up Bone branch on the left. The bed section is:

Young Coal

	Feet	Inches
White, thin-bedded sandstone	2	
Light-gray, sandy shale		4
Thin-bedded sandstone		6
Splint coal		12
Block and splint coal		24
Sandstone		
Elevation	1055	

This coal has an interval of approximately 145 feet to the Fire Clay coal.

The Fossil limestone shows ½ mile up Bone branch, on the right of a left branch, at elevation 996.

Three hundred yards above the mouth of Bone branch, on the left of Trace fork, the Whittaker coal has been opened, at elevation 1047, by Melvin Wireman, but the opening is now completely caved. The roof alone now shows in partial exposure. This coal was reported to be 37 to 38 inches thick.

FODDERSTACK BRANCH

Six hundred yards above the mouth of Bone branch is a right hand branch known as Fodderstack branch. At the mouth of this branch on the right, the Fossil limestone shows at elevation of 956.

Three hundred and fifty yards up Fodderstack branch, on the left, the Young coal has been prospected at elevation 1021. The Young coal has been opened by Melvin Wireman one-half mile up Fodderstack branch on the right, but the opening is now completely caved. The elevation of the opening is 1015. The following section was obtained here:

Section

		Feet
Massive sandstone		4
Coal	Elevation	1035
Covered interval		11
Coal	Elevation	1024
Covered interval		9
Young coal	Elevation	1015

The following section was made on the right of Trace fork, one-fourth mile above the mouth of Fodderstack branch:

Section

	Feet
Top of hill on massive Puncheon Creek sandstone, elevation	1269
Massive sandstone	114
Covered interval	111
Bench	
Covered interval	19
Massive sandstone and covered to base of hill	
Place of Fire Clay coal (below drainage) ..... Elevation	904

RYE BRANCH

Rye branch is a right branch of Trace fork one-fourth mile below Waldo P. O. Five hundred yards up Rye branch, on the left, the Fossil limestone is found in the bottom of a well at elevation 958.

Three-fourths mile up Rye branch, on the right, the Hazard coal has been opened by J. B. Wireman at elevation 1084. The opening is now completely caved, the roof only showing. The coal is reported 4 feet thick with 6 inches of parting near the top of the bed.

The Young coal has been opened by J. B. Wireman seven-eighths mile up Rye branch, on the left, at elevation 1032. The opening is completely caved. The Young coal is opened by J. B. Wireman in a 45-foot wet entry at Waldo, on the left of Trace fork. The bed section here is:

Young Coal

	Feet	Inches
Light-gray, clay shale with plant imprints	12	
Block coal		32
Elevation	1045	

A section on the hill at this point gives:

Section

	Feet
Bench ..... Elevation	1090
Covered interval	45
Coal opening (Young coal) ..... Elevation	1045
Covered interval	57
Bench and coal bloom—Trace Fork coal ..... Elevation	988
Covered interval	10
Fossil limestone ..... Elevation	978

RIGHT FORK OF TRACE FORK

Elevation of Mouth 948.

The Young coal is opened in a 30-yard entry by Joe Wireman, one-fourth mile up this fork on the right. The bed section is as follows:

Young Coal

	Feet	Inches
Light-gray, thick-bedded shale	5	
Bituminous shale		4
Block coal		38
Light-gray, clay-shale floor		
Elevation	1047	

The coal of this bed is a block and splint coal. In the lower there is considerable hard, dull coal. There is a hard, fine-grained, massive sandstone shortly under this coal 20+ inches thick. A massive, cliff-forming sandstone, resembling at a distance the High Rock sandstone, is exposed about 120 feet over the bed.

The Whittaker coal has been opened at elevation 1077 by Joe Wireman 800 yards up this right fork, on the left. The opening is now completely caved. This coal was reported to be a little thicker than that of the Young bed mentioned above.

Three-fourths of a mile up this fork there is a large left branch known as Big branch. The Fossil limestone shows on the right, 200 yards up, at elevation 978, immediately under a 2-foot ledge of massive sandstone. One-half mile upstream the branch forks and the Young coal has been opened by Steve Wireman 400 yards up the right fork, on the right. The bed section follows:

Young Coal

	Feet	Inches
Gray, clay shale with numerous plant imprints		
Block coal		6
Light-gray shale		1
Block coal		2¼
Shale		3¼
Block coal		34
Elevation	1032	

The following section shows below this coal:

		Feet
Covered interval		8
Block coal, 8 inches	Elevation	1024
Dark-gray, fissile shale		1½
Covered interval		5½
Bastard limestone		
Covered interval		5
Thin, gray, impure limestone bed	Elevation	1011
Covered interval		31
Fossil limestone	Elevation	980

About one mile up this fork, on the left, the Trace Fork coal shows in natural exposure as follows:

Trace Fork Coal

	Feet	Inches
Light-gray, sandy shale		
Block coal	12	
Elevation		980

The Fossil limestone goes under drainage 1½ miles up this fork at elevation 985.

One and three-fourths miles up this fork the horizon of the Trace Fork coal is represented by coal streaks cross-bedded in the base of a massive sandstone.

The Hazard coal is opened in a 20-yard entry two miles up the fork and one-half mile up a left branch. The bed sections is as follows:

Hazard Coal

	Feet	Inches
Shaly sandstone	2	
Light-gray, sandy shale	4	
Block coal		25¾
Elevation	1145	

A section on this branch is as follows:

Section

		Feet
High Rock sandstone		20
Base at elevation		1277
Covered interval		57
Coal bloom—Flag coal	Elevation	1220
Covered interval		75
Coal opening—Hazard coal	Elevation	1145
Massive sandstone		81
Covered interval		24
Bench and place of Trace Fork coal	Elevation	1040
Massive sandstone		36
Covered interval		54
Place of Fire Clay coal	Elevation	950

Two and one-eighth miles up the fork the Trace Fork coal shows in natural exposure in the bed of the stream at elevation 1044. This coal is here approximately 6 inches thick and lies between massive sandstones.

Three miles up this fork a split of the Young coal shows in natural exposure. A partial section is:

Young Coal

	Feet	*Inches*
Massive sandstone	3	
Block coal		14½+

TRACE FORK ABOVE THE MOUTH OF THE RIGHT FORK

One-fourth mile above the mouth of Right fork there is a large left branch. Three hundred yards up this left branch, on the right, the Haddix coal has been prospected by Wiley Wireman. The bed section here is:

Haddix Coal

	Feet	*Inches*
Light-gray, sandy shale		
Light-gray, fissile, clay shale		4
Block coal		2
Shale		½
Block coal		6
Light-gray, sandy shale	3½	
Block coal		1
Shale		½
Bituminous shale		1½
Block and splint coal		19½
Soft, gray shale		
Elevation	970	

The following section was obtained here:

Section

		Feet
Puncheon Creek sandstone, base at elevation		1222
Covered interval		71
Bench and coal bloom—Flag coal	Elevation	1151
Covered interval		68
Bench		
Covered interval		20
Massive sandstone cropping out in smooth ledges		21
Covered interval		73
Coal prospects—Haddix coal	Elevation	970
Place of Fire Clay coal	Elevation	900

The Trace Fork coal has been opened by Wiley Wireman one-half mile up Batelick branch (a branch on the left one-half mile up), and 250 yards up the first left branch on the right fork of this branch. The opening was caved at the time of visit. A partial section is:

Trace Fork Coal

	Feet	*Inches*
Massive sandstone	2	
Covered	5	
Light-gray, sandy shale	2	
Block coal		2½
Light-gray, sandy shale	2	
Block coal		18+
Elevation	1045	

This coal was reported to be 3½ feet thick.

On the hill to the left of this opening, the Hazard coal has been opened by Wiley Wireman, but the opening is now completely caved. The elevation here is 1160. This coal was reported to be 48 inches thick, solid coal. The following section shows on this branch:

Section

		Feet
Base of massive, cliff-forming sandstone	Elevation	1260
Covered interval with slight bench		100
Coal opening and bench—Hazard coal	Elevation	1160
Covered interval, massive sandstone at base		100
Covered interval		15
Coal prospect—Trace Fork coal	Elevation	1045
Covered interval		9
Soft, fissile, gray shale		12
Covered interval		12
Fossil limestone, 14 inches	Elevation	1012
Soft, fossiliferous shale		6
Covered interval		6
Hard, sandy limestone with fresh water molluscs, 5 inches	Elevation	995
Place of Fire Clay coal	Elevation	938

The Haddix coal shows in natural exposure 400 yards up the branch above the mouth of Batelick branch. A partial section is:

Haddix Coal

	Feet	*Inches*
Massive sandstone	4	
Gray shale with a few small calcareous concretions	7	
Block coal		8
Light-gray shale		17½
Block coal		2
Shale		½
Block coal		8+
Elevation	982	

One mile up the branch the top of the same coal bed shows at elevation 990. The following section was obtained at this point on the left bank of the stream:

Haddix Coal

	Feet	Inches
Massive sandstone	1	
Light-gray shale with occasional calcareous concretions	5	
Block coal		2
Light-gray, sandy shale	1	
Block coal		18
Shale	12	
Block coal		3½
Gray, fissile shale		6+
Elevation	990	

About a mile up this branch a 1½-foot bed of dark gray, soft sandstone carrying concretions of solid iron pyrite up to 5 inches in diameter, is exposed in the bed of the stream. The sandstone also shows occasional discontinuous veins of pyrite. This sandstone is just below the Haddix coal. A 6-inch bed of coal comes 8 inches over the Haddix coal, which is badly split here. This is probably a low split of the Haddix and the intervening interval is dark gray shale.

Three hundred yards below Barb fork, on the right of the stream, the Haddix coal has been prospected and shows the following section:

Haddix Coal

	Feet	Inches
Massive sandstone with coal streaks cross-bedded in the base of the sandstone	3	
Dark, blue-gray shale	4	
Block coal		3
Soft gray clay shale		14
Block coal		7
Light-gray shale		1½
Block coal		6½
Cannel slate		3
Coal		9
Shale		½
Coal		11½
Elevation	1010	

One hundred yards above this prospect, on the left bank of the stream, the same bed has been prospected, showing the following bed section:

Haddix Coal

	Feet	Inches
Shale		
Block coal		6
Coal and shale interlaminated		2½
Block coal		4¼
Shale		½
Block coal		1¾
Shale		¼
Coal		1¼
Shale		1¼
Splint coal		19
Elevation	1022	

The strata show a marked downstream dip.

One and one-fourth miles up this branch the Haddix coal shows in natural exposure on the left. In this exposure the quick changes of bed section which characterize the Haddix coal on this branch are well shown, a shale parting increasing from 5 inches to 2 feet in thickness in a distance of 10 feet.

The Whittaker coal has been opened one-half mile up Barb fork, on a left fork, at elevation 1113. The opening, now completely caved, is on the land of the heirs of Abe Wireman.

Three hundred yards above the mouth of Barb fork, the Haddix coal goes under drainage at elevation 1026. Three miles up the branch the Fossil limestone is exposed in the bed of the stream at elevation 1043. The strata dip rapidly down the branch for 150 yards above this point. The limestone is exposed in the bed of the stream at elevation 1047.

LEFT FORK OF TRACE FORK

The bloom of the Haddix coal shows on the right of the road, one mile up this fork, above Waldo. The bloom appears to be of a 4-inch bed at elevation 973. One hundred yards above this point the following section was obtained on the right:

Section

		Feet
High Rock sandstone, base at	Elevation	1196
Covered interval		54
Bench		
Covered interval		16
Coal bloom and bench—Hazard coal	Elevation	1126
Covered interval		44
Whittaker coal { Massive sandstone......3' Soft, light-gray shale....6' Block coal.....32 to 35½" }	Elevation	1082
Covered interval		20
Massive, hard, fine-grained sandstone weathering with smooth faces		42
Covered interval		10
Covered interval		26
Fossil limestone	Elevation	984
Covered interval		11
Coal bloom—Haddix coal	Elevation	973

The opening into the Whittaker coal mentioned in the above section is on the land of Noel Wireman. The lower portion of the coal was concealed in water but the bottom of the bed was reached with little doubt. The opening is 20 feet deep and partly caved and wet.

About seven-eighths mile up this branch is a branch on the right known as Big Run. The Whittaker coal is opened by Noel Wireman 350 yards up Big Run, on the left, in a 30-foot entry. The bed section is:

Whittaker Coal

	Feet	Inches
Massive sandstone	6	
Shaly sandstone	4	
Block coal		32
Black shale floor		
Elevation	1104	

This is excellent quality block coal. One block was observed on the dump which was 15 inches thick.

There are two openings here 20 feet apart. There is a strong dip down Big Run, the limestone being exposed in the bed of the stream 800 yards up at elevation 1022.

The Fugate coal has been opened by Grenville Wireman one-fourth mile up a small left branch, one mile up Left fork of Trace fork. The bed section is as follows:

Fugate Coal

	Feet	Inches
Shaly sandstone	6	
Splint coal		6
Brownish shale		1 to 1½
Splint coal		12
Shale		2½
Splint coal		7½ to 8½
Bituminous shale		2½ to 3
Block coal		6
Bituminous shale		13½
Block coal		19½
Shale floor		
Elevation	1206	

The following section was obtained on this branch:

Section

	Feet
Puncheon Creek sandstone, base at .... Elevation	1248
Covered interval	42
Coal opening—Fugate coal .... Elevation	1206
Covered interval	15
Bench	
Covered interval	21
Bench	
Covered interval	63
Bench	
Covered interval	95
Massive sandstone	25
Approximate elevation of fossil limestone	985

The Trace fork coal shows in natural exposure up Big Run opposite the mouth of Minix fork. A partial section here is:

Trace Fork Coal

	Feet	Inches
Blue-gray shale	5	
Block coal		1½
Shale		2½
Block coal		5+
Elevation	975	

The bottom of this coal was below stream level.

MINIX FORK

The Haddix coal is partially exposed naturally, 300 yards up Minix fork, on the left.

Haddix Coal

	Feet	Inches
Dark, fissile shale with small concretions		
Block coal		2½+
Elevation	990	

On hundred feet farther up Minix fork the Haddix coal shows the following bed section in natural exposure:

Haddix Coal	Feet	Inches
Light-gray, thin-bedded, sandy shale	1½	
Soft, gray shale	1½	
Block coal		3
Soft, gray shale		2½
Block coal		7
Shale		10
Block coal		1
Shale		½
Block coal		4½
Black shale floor		
Elevation		998

There is a pronounced dip down Minix fork. The Haddix coal goes under drainage 700 yards up Minix fork at elevation 1003.

The Flag coal has been opened in a 20-yard, wet entry, by Lenville Rowe, three-fourths mile up Minix fork, 250 yards up a left hollow, on the right. The bed section is:

Flag Coal	Feet	Inches
Thin-bedded sandstone	1½	
Splint coal		25
Block coal		9
Shale		6
Block coal		17
Elevation	1173	

A section at this point is as follows:

Section		Feet
Massive, cliff-forming sandstone, elevation of base		1248
Covered interval		75
Coal opening and bench—Flag coal	Elevation	1173
Covered interval		30
Bench		
Covered interval		120
Fossil limestone	Elevation	1023

The Fossil limestone shows in the bed of Minix fork, at elevation 1048, 200 yards farther up.

The Trace Fork coal has been prospected by Rube Bailey, seven-eighths mile up Minix fork on the right. The bed section is:

Trace Fork Coal	Feet	Inches
Massive sandstone	6	
Block coal		18
Elevation		1053

One hundred yards up the fork an opening has been made into the bloom of the Flag coal at elevation 1183.

LEFT FORK OF TRACE FORK ABOVE THE MOUTH OF MINIX FORK

Five-eighths mile up the left fork of Trace fork, above the mouth of Minix fork, the Haddix coal has been raised from the bed of the stream by Billy Howard at elevation 987. The thickness of the bed could not be ascertained but was over one foot.

Two hundred yards above the mouth of Grassy branch, this bed has risen above stream level. In a prospect here by Billy Howard the Haddix coal shows the following bed section:

Haddix Coal

	Feet	Inches
Light-gray shale	4	
Dark-gray shale	1½	
Block coal		2½
Light-gray shale		3½
Splint coal		7
Black shale		1
Block coal		9½
Elevation	994	

A low split of the Young coal is opened by Cal Hale 3 miles up the left fork of Trace fork, on the left of a schoolhouse. The bed section is as follows:

Young Coal

	Feet	Inches
Massive sandstone	5	
Block coal		17½
Elevation	1053	

The Whittaker coal has been opened by Cal Hale, at elevation 1122, one-fourth mile up the fork, on the right. The opening is now completely caved. This coal was reported to be between 29 and 32 inches thick.

Three and three-fourths miles up the fork the Whittaker coal has been prospected by Boyd Miller. The prospect is now caved. A partial section is:

Whittaker Coal

	Feet	Inches
Light-gray sandy shale		
Block coal		28+
Elevation	1138	

This coal was reported as 4 feet thick but it is doubtful if the bed is more than 34 inches thick.

Two hundred yards upstream the following section was obtained on the right of the stream:

Section

	Feet	Inches
Coal bloom—Trace Fork coal.........Elevation	1070	
Hard, thin-bedded sandstone	12	
Light-gray, soft clay shale carrying calcareous concretions	19	
Fissile, gray shale		4
Coevred—shale and fossil limestone float		28
Gray, calcareous shale with fossils		28
Light-blue calcareous shale		4
Covered interval		4
Elevation, level of stream	1035	

The Fossil limestone is exposed 700 yards below the mouth of Ashlog branch, on the left of the fork at elevation 1042.

One-fourth mile below the mouth of Ashlog branch, the Fossil limestone bed shows 1½ feet thick at elevation 1050.

Ashlog Branch

Three hundred yards up Ashlog branch, on the left, is a massive sandstone 10 feet thick. In the lower three feet of this sandstone are many coal streaks and lenses which lie at all angles to the plane of stratification.

The horizon of the Trace Fork coal is within a few feet of the base of this. The Trace Fork coal has been raised from the bed of the stream one-half mile up Ashlog branch. A partial section of the bed here is:

Trace Fork Coal

	Feet	Inches
Massive sandstone with coal streaks cross-bedded in the base	15	
Light gray, sandy shale	2	
Covered interval		34½
Splint coal		10+
Elevation	1080	

LICKING RIVER ABOVE THE MOUTH OF TRACE FORK

SEAL'S BRANCH

This branch enters Licking river 1¾ miles above the mouth of Trace fork. The following section was obtained on this branch. This section is corrected for a dip of 12 to 15 feet which occurs from the head of Seal's branch to its mouth.

Section

	Feet
High Rock sandstone, elevation of base	1178
Covered interval	200
Fossile limestone ... Elevation	978
Interval, largely soft, gray, sandy shales	8
Massive sandstone	8
Light gray, thick-bedded, sandy shale	10

BEE TREE BRANCH

Bee Tree branch is a right branch of Licking river entering the river three-fourths mile above the mouth of Trace fork.

Three hundred yards up Bee Tree branch, on the left, the Haddix coal shows in natural exposure as follows:

Haddix Coal

	Feet	Inches
Light-gray, soft, thick-bedded shale		
Block coal		5
Light gray, clay shale with plant imprints Elevation	985	

Bee Tree branch forks three-eighths mile up. The Fossil limestone is exposed three-eighth mile up the right fork in the bed of the stream at elevation 998. Seven-eighths mile up this fork the limestone shows in the bed of the stream at elevation 1030. There is a very marked dip down the branch, the limestone showing at about the gradient of the stream between these two points.

Five-eighths mile up the right fork of Bee Tree branch the bloom of the Trace Fork coal shows on the right bank. The bloom is about 2 feet thick and has a light gray, clay shale roof. The elevation of the coal here is 1049. From this point up the bed rises with the stream for approximately 250 yards. Two hundred and fifty yards up the fork this bed shows the following bed section:

Trace Fork Coal

	Feet	Inches
Massive sandstone	2	
Block coal		10
Light-gray, clay shale		
Block coal		6
Soft gray shale		
Elevation	1060	

LEFT FORK OF BEE TREE BRANCH

One-fourth of a mile up this fork is a left branch. Between the mouth of the fork and the mouth of this left branch, coal of the Haddix bed has been dug from the bed of the stream at a number of points. The bed could not be measured, but the impression obtained was that it was a thin bed.

One-third mile up this branch the Fossil limestone shows at elevation 1025. The base of the High Rock sandstone at the head of this branch is at elevation 1231.

Three hundred yards above the mouth of this branch the Haddix coal shows in natural exposure at the left of the stream as follows:

Haddix Coal

	Feet	Inches
Dark, blue gray shale		
Block coal		2
Light gray, clay shale with plant imprints		
Elevation	985	

The Fossil limestone shows in the bed of the stream one mile up this fork at elevation 1015. There is a dip down this fork, the stream running in the soft shales which lie just below the Fossil limestone for much of its course.

The Whittaker coal is opened one mile up this fork and 250 yards up a right hollow on the right. This opening is on the land of the heirs of Abe Wireman. The bed section is as follows:

Whittaker Coal

	Feet	Inches
Massive sandstone	6	
Splint coal		14½
Block coal		19
Soft clay shale floor		
Elevation	118	

LICKING RIVER ABOVE THE MOUTH OF BEE TREE BRANCH

One-half mile above the mouth of Bee Tree branch, on the right of Licking river, Mr. Nealy has an entry, partly caved, into the Whittaker coal. The bed section is:

Whittaker Coal

	Feet	*Inches*
Light gray, soft, thick-bedded shale with plant imprints	7	
Semi-cannel slate		2
Block coal		7½
Light gray, clay shale		2½
Block coal		36½
Elevation	1077	

Three hundred yards below the mouth of Bull creek an opening was being made at the time of visit into the Whittaker coal. The bed section is:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	4	
Block coal		54
Elevation	1104	

The following section was obtained here:

Section

	Feet
Puncheon Creek sandstone, base at ....Elevation	1279
Covered interval, massive sandstone at base	112
Covered interval	63
Coal opening (bed section given above) Whittaker coal ....Elevation	1104
Covered interval	37
Bench	
Place of fire clay coal ....Elevation	920

The Haddix coal has been opened in a 15-foot wet entry one-fourth mile up Bull creek on the left. The bed section is as follows:

Haddix Coal

	Feet	*Inches*
Massive sandstone	4	
Splint coal		8
Shale		2
Splint coal		8
Bituminous clay slate		3
Splint coal		13
Elevation	980	

About two-thirds mile up Bull creek is a right branch known as Lick branch. At the mouth of the branch, on the left, the following section was obtained:

Section

	Feet
Puncheon Creek sandstone, elevation of base	1275
Covered interval	25
Bench	
Covered interval	38
Bench and top of massive sandstone ledge	
Massive sandstone	16
Covered interval	74
Coal bloom, Whittaker coal .... Elevation	1118
Covered interval	23
Bench	
Covered interval	40
Bench	
Covered interval	43
Fossil limestone .... Elevation	1012

The following section was obtained 350 yards up Lick branch on the left:

Section

	Feet
Coal bloom { Coal 3″ Shale 4′ Coal 3″ } Young coal, Elevation	1090
Covered interval	54
Shales, dark-gray in lower portion, light-gray and thick-bedded in upper portion	17
Fossil limestone .... Elevation	1019
Soft, gray shale	2
Light-gray, thick-bedded, sandy shale	8
Soft, dark-gray shale	8
Hard, gray shale	5
Massive sandstone	13

The base of the section is at 982.

One-half mile up Lick branch is a left branch. The Fossil limestone shows in the mouth of this branch in the bed of the stream at elevation 1018.

Three hundred yards up this branch, on the right, Sue Wireman has a 20-yard wet entry into the Young coal. The bed section is as follows:

Young Coal

	Feet	Inches
Light-gray, thick-bedded shale	7	
Block coal		50
Elevation	1080	

Three-fourths of a mile up Lick branch the Fossil limestone is exposed in the bed of the branch at elevation 1018.

One mile up Lick branch and 250 yards up a branch a high split of the Young coal has been prospected, at elevation 1092, at several points on the right of the stream on the land of Henry Bradley. The prospects were completely caved. This coal was reported 44 inches thick. The following section was obtained at this point:

Section

			Feet
Coal bloom		Elevation	1162
Covered interval			47
Whittaker coal	Massive sandstone... 4′ Coal ... 10″ Shale Coal ... ?″	Elevation	1115
Covered interval			22
High split of Young coal, reported 44-inch		Elevation	1092
Covered interval			17
Young coal—appears less than 24-inch		Elevation	1075
Covered interval			57
Place of fossil limestone		Elevation	1018

Seven-eighths mile up Bull creek on the left Dan Wireman has an opening into the Whittaker coal. The bed section is as follows:

Whittaker Coal

	Feet	Inches
Light-gray to white shale with plant imprints...	4	
Block coal		13
Medium-gray, soft clay shale		53
Splint and block coal		24
Block coal		41
Shale		¾
Block coal		2
Elevation	1118	

This entry penetrates the hill 100 yards or more. There are many different kinds of coal in this bed and the impression gained was that, though the thickness is good, the quality of the coal was not very good.

One and one-eighth miles up Bull creek the Haddix coal shows in natural exposure, on the right, at stream level. This bed section is:

Haddix Coal

	Feet	Inches
Massive sandstone	3	
Splint coal		8
Light-gray, clay shale		6
Block coal		8
Bituminous clay shale		2¾
Block coal		16½
Elevation	1005	

One and three-fourths miles up Bull creek the Fossil limestone shows in natural exposure at the mouth of a small right branch at elevation 1041.

The Young coal has been opened by William Smith in a 30-foot wet entry, one-fourth mile up this branch on the left. The bed section is:

Young Coal

	Feet	Inches
Shaly sandstone	1½	
Gray, soft clay shale	4	
Splint coal		14
Block coal		20+
Elevation	1116	

The lower part of the coal was in mud and water, but by sounding, the bottom of the bed was pretty certainly reached at 6 inches below the base of the section given above. This gives a thickness of 40 inches for the coal. This bed correlates with the high split of the Young coal prospected at the head of Lick branch. This bed has an interval of 150 to 154 feet to the Fire Clay coal. The bed section corresponds very well with that of the coal at the head of Lick branch, which was reported to be 49 inches thick. The following section was made on this branch:

Section

		Feet
Base of Puncheon Creek sandstone	Elevation	1222
Covered interval		30
Coal bloom—Flag coal	Elevation	1192
Covered interval		76
Coal opening—Young coal	Elevation	1116
Covered interval		72
Place of fossiliferous limestone	Elevation	1044

Two and one-fourth miles up Bull creek is a left fork. One hundred and fifty yards up this fork the Fossil limestone shows in the bed of the stream at elevation 1060.

The Whittaker coal is opened by T. B. Whittaker 650 yards below the mouth of Grassy creek, on the left of a right hollow. The bed section is:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	8	
Block coal		13½
Light-gray, soft, clay shale		52
Coal		56
Elevation	1160	

The following section shows here:

Section

	Feet
Puncheon Creek sandstone, base at .... Elevation	1325
Covered interval	60
Bench	
Covered interval	105
Coal opening—Whittaker coal .... Elevation	1160
Covered interval	176
Fire Clay coal .... Elevation	984

Two hundred yards above the mouth of Grassy creek on the left of the river, at river level, Benton Whittaker has an opening into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Shale	6	
Coal		2
Light-gray shale		3
Coal		2½
Light-gray shale		26
Coal		16
Flint fire clay		2½
Coal above water		10
Interval between water level and the floor of the opening		15
Elevation	984	

The lower 15 inches, which are under water, are probably coal; the upper 6 inches at least is coal.

The Hamlin coal has been opened in a 13-foot wet entry by Jim Shepard one-fourth mile above the mouth of Grassy creek and 300 yards up a right branch, on the right of the branch. The bed section is as follows:

Hamlin Coal

	Feet	*Inches*
Massive sandstone to shaly sandstone	6	
Block coal		4½
Knife edge shale parting		
Block coal		12
Soft, bituminous shale		2
Block coal		12
Elevation	1023	

One-third mile above the mouth of Grassy creek, on the left of the Licking River road, the Fire Clay Rider shows in natural exposure as follows:

Fire Clay Rider

	Feet	*Inches*
Bituminous shale	1	
Block coal		16
Shale	3	
Massive sandstone	4	
Block coal		12
Reddish-brown shale		¼
Block coal		22¾
Light shale		
Elevation	995	

It is possible that this bed may be an upper split of the Fire Clay coal.

One-half mile up Licking river and 250 yards up a small left hollow the Whittaker coal has been opened by Bob and Charley Vanderpool. The bed section is:

Whittaker Coal

	Feet	*Inches*
Light-gray, thick-bedded, clay shale	5	
Block coal		18½
Dark-gray shale		1 to 2
Block and splint coal		21 to 22
Light-gray, clay shale ....Elevation	1160	

The following section was made at this point:

Section

		Feet
Coal opening—Whittaker coal	Elevation	**1160**
Covered interval		**136**
Massive sandstone with thin shells of limonite in the base		**3**
Hamlin coal ...	**Block coal** ....**6½"** **Light-gray clay shale** ....**2½"** **Block coal** ....**8"+** Elevation	**1121**
Covered interval		**9**
Light-gray, thick-bedded, clay shale		**5**
Massive sandstone		**4**
Coal (same as mentioned on preceding page at elevation 995	Elevation	**1003**
Thick-bedded, light-gray, clay shale		**1**
Covered interval		**2**
		Inches
High split of Fire Clay coal..	**Block coal** ...	**6**
	Shale	**½**
	Block coal ...	**4½**
Light-gray, clay shale floor	Elevation	**990**

The Whittaker coal has been opened in a left hollow three-fourths mile above the mouth of Grassy creek, on Licking river. The opening here by Elkanah Gearhart gives the following bed section:

Whittaker Coal

	Feet	*Inches*
Light-gray, thick-bedded, sandy shale	**6**	
Block coal		**20**
Gray, clay shale		**18**
Block and splint coal, inter-laminated		**31½**
Light-gray, clay shale		**24 (±4)**
Block coal		**16**
Light-gray, clay shale		**1**
Block coal		**5**
Light-gray, clay shale		**2**
Block coal		**6**
Elevation	**1160**	

The Whittaker coal comes at the upper break of a prominent branch.

The following section was obtained at this point:

Section

	Feet
Puncheon Creek sandstone Elevation	1302
Covered interval	37
Coal bloom—Fugate coal Elevation	1265
Covered interval	30
Prominent bench	
Covered interval	75
Whittaker coal opening (bed-section given above...Ele.	1160
Covered interval	10-15
Prominent bench	

Seven-eighths mile above the mouth of Grassy creek, on the right side of Licking river, the Fire Clay Rider shows in natural exposure. The bed section is:

Fire Clay Rider

	Feet	Inches
Shaly sandstone	4	
Block coal		11½
Light-gray shale	2	
Elevation	995	

One hundred yards above this point the Hamlin coal has been opened on the left bank of the river by Billy Shepard at elevation 1045. This opening is now completely caved.

Two hundred and thirty yards up a small, left branch at this point the Haddix coal has been opened by Billy Shepard in an opening, now completely caved, on the right of the branch. A partial section of this bed is:

Haddix Coal

	Feet	Inches
Dark-gray, sandy shale	3	
Thick-bedded, gray, clay shale	5	
Block coal		16+
Elevation	1064	

One-third mile below the mouth of Salt Lick fork, on the left bank of Licking river, a prospect has been made into the Flag coal. The bed section follows:

Flag Coal

	Feet	Inches
Thin-bedded sandstone, shaly-sandstone and thin-bedded, sandy shale	3	
Splint coal		10½
Bone coal		1½
Block cal		13½
Bone coal		1
Splint coal		8½
Elevation	1240	

A section at this point is as follows:

Section

		Feet
Base of Puncheon Creek, sandstone	Elevation	1328
Covered interval		23
Bench		
Covered interval		17
Bench		
Covered interval		48
Flag coal opening	Elevation	1240
Covered interval		45
Bench		
Covered interval		43
Bench		
Covered interval		162
Place of Fire Clay coal at	Elevation	990

Five hundred yards below the mouth of Salt Lick fork is a small right hollow behind a house. One hundred yards up this hollow, on the right, is an opening by Elkanah Gearhart into the Hamlin coal, which is largely caved. A partial section is:

Hamlin Coal

	Feet	Inches
Thick-bedded, light-gray, clay shale	7	
Block coal		8
Shale		2
Block coal		6+
Elevation	1035	

Three hundred yards up this hollow, on the left, the Whittaker coal has been prospected by Elkanah Gearhart. The bed section is:

Whittaker Coal

	Feet	Inches
Light-gray shale		7
Block coal		11
Light-gray, soft shale		10½
Block and splint coal, inter-laminated		26½
Gray shale floor		
Elevation	1180	

SALT LICK FORK

Two hundred yards up Salt Lick fork the Fire Clay Rider shows in natural exposure on the right bank of the stream, as follows:

Fire Clay Rider

	Feet	*Inches*
Gray, clay shale	1	
Block coal		6½
Soft, gray, clay shale floor .... Elevation	1004	

Three hundred yards up Salt Lick fork is a left branch known as Spruce Pine branch. One-third mile up Spruce Pine branch the Hamlin coal shows in natural exposure in the bed of the stream. The bed section is as follows:

Hamlin Coal

Massive sandstone		
Block coal		6½
Shale		8
Coal		1
Shale with thin coal seams		8
Block coal		6½
Elevation	1048	

Three hundred and fifty yards up Salt Lick fork a very noticeable northerly dip of 6° shows in the bed of the stream.

The Whittaker coal is opened by Sam Bailey in a 40-foot entry one-half mile up Salt Lick fork, 300 yards up a right branch on the right. The bed section is:

Whittaker Coal

	Feet	*Inches*
Light-gray, sandy shale		
Block coal		13
Gray, clay shale		14
Block coal		31
Soft, gray, clay shale floor		
Elevation	1180	

The following section was obtained here:

Section

	Feet
Base of Puncheon Creek sandstone .... Elevation	1360
Covered interval	67
Massive ledge-forming sandstone	28
Covered interval	85
Whittaker coal opening .... Elevation	1180
Covered interval	180
Place of Fire Clay coal .... Elevation	1000

Three hundred yards above the mouth of Salt Lick fork is the junction of Straight fork and Road fork. One hundred yards up Road fork coal has been dug from the bed of the stream from the Fire Clay coal bed. The excavation was completely filled in at the time of visit. Flint fire clay fragments were found on the dump. The bed section was reported to be as follows:

Fire Clay Coal

	Feet	Inches
Coal		12
Black slate		1
Coal with a 2-inch shale parting		18
Elevation	994	

For one-fourth mile up Road fork a high split of the Fire Clay coal bed and the massive sandstone which lies over the Fire Clay coal rise with the stream.

Three-fourths mile up Road fork, Alum Cave branch enters on the right. One-third mile up Alum Cave branch the Fire Clay Rider shows on the right of the stream in natural exposure. The bed section is:

Fire Clay Rider

	Feet	Inches
Light-gray, sandy shale	2½	
Soft, gray shale		
Block coal		4
Soft, clay, shale floor		
Elevation	1037	

Three-fourths mile up Road fork above the mouth of Alum Cave branch the Hamlin coal shows in natural exposure on the left of the stream. The bed section is:

Hamlin Coal

	Feet	Inches
Massive sandstone		
Block coal		18
Light-gray, shale floor		
Elevation	1062	

The following section shows on this portion of Road fork:

Section

		Feet
Base of Puncheon Creek sandstone	Elevation	1355
Interval—largely massive, cliff-forming sandstone		82
Base of high-rock sandstone	Elevation	1273
Covered interval		100
Bench and coal bloom—Whittaker coal	Elevation	1173
Covered interval		61
Doubtful coal bloom (Trace Fork?)	Elevation	1112
Covered interval		22
Massive sandstone		18
Hamlin coal	Elevation	1072
Massive sandstone		7
Light-gray, thick-bedded, clay shale		15
Covered interval, massive sandstone in the lower portion		40
Place of Fire Clay coal	Elevation	1010

STRAIGHT FORK

A thin coal coming between the Fire Clay Rider and the Hamlin coal is shown in natural exposure on the left of Straight fork, five-eighths mile up and 20 feet above the stream.

The Fire Clay Rider shows in natural exposure one mile up Straight fork, on the left, opposite a house:

Fire Clay Coal Rider

	Feet	Inches
Soft, light-gray, clay shale		
Block coal with discontinuous pyrite seams		7½
Shale		1
Block coal		6½
Soft, gray, clay shale floor		
Elevation	1037	

Five hundred yards up the stream the same bed shows in the bed of the stream at elevation 1050. This shows a downstream dip.

Straight fork forks 1½ miles up. One-eighth mile up a left fork of the left fork of Straight fork the Fossil limestone shows in the bed of the stream at elevation 1135. Giving the average interval of 85 feet for this region to the Fire Clay coal from the Fossil limestone, the elevation of the Fire Clay coal is 1050. This shows a rise of 56 feet from the mouth of Straight fork to its head.

The Fugate coal is opened in a 15-yard entry by William Bailey one-fourth of a mile up this left fork of the right fork of Straight fork on the left. The bed section is as follows:

Fugate Coal

	Feet	Inches
Light-gray, sandy shale	5	
Block coal with much hard, dull coal		32
Shale		4
Block coal		14
Elevation	1342	

One hundred and fifty yards below this opening the Whittaker coal has been prospected by William Bailey. The bed section follows:

Whittaker Coal

	Feet	*Inches*
Light-gray, thick-bedded, clay shale	2	
Block coal		6
Shale		1
Block coal		11
Elevation	1245	

The following section was obtained on this branch:

Section

		Feet
Base of massive cliff-forming sandstone	Elevation	1378
Covered interval		41
Fugate coal opening	Elevation	1342
Covered interval		23
Bench		
Covered interval with massive ledge-forming sandstone in the upper portion		74
Coal opening—Whittaker coal	Elevation	1245
Covered interval		110
Fossil limestone	Elevation	1135

ROCKHOUSE CREEK

Elevation of mouth, 776.

Rockhouse creek drains an area in Magoffin county of approximately 9½ square miles, lying in the extreme northern part of the county. Only about one-half of the creek is included in the county, the line crossing about 3 miles up.

The strata exposed above drainage on this creek range from the massive High Rock sandstone down to those coming 60 to 80 feet below the Whitesburg coal. Considerable disturbance of the rocks on this creek has taken place, caused by the Caney fault and anticline. The fault runs just to the north of the stream for the greater part of its length, but crosses it in several places in the vicinity of Haleburg, and then parallels the left fork on the north to its head, where it crosses it. The axis of the Caney anticline is 1¾ miles south of the fault and parallels it, following the ridge between Rockhouse and Raccoon creeks. This gives a strong dip to the north as far as the fault, the angle of dip being as much as 10° at the fault. This dip is easily seen in the benches and ledges of sandstone on the hillsides for the entire length of the stream. Beginning at the forks there is a marked rise of the strata to the east toward the Mine Fork dome, and the resultant of the northern and western dips gives a northwestern dip to the rocks on the two forks of the creek. On the north or upthrow side of the fault the rocks are practically horizontal below the forks, but the rise to the east begins just above that point and becomes more and more rapid toward the head of the stream. The structure contour map which accompanies this report shows fully the structure on this stream.

Comparatively few openings into the coals on this creek were found, neither were there many natural exposures. Of the upper coals, the Flag Rider, Flag and Hazard, none were opened and all that is known of them is that they are present, as shown by their blooms. The High Rock and Puncheon Creek sandstones, which are here united, form beautiful cliffs on the ridges on the lower part of the creek, but toward the head, where the lower strata are brought to a high elevation, they are missing. On the lower part of the creek the Hazard and Flag coals are fairly low in the hills and would have a good area.

The Whittaker coal is missing, unless a thin coal bloom found 20 feet over the Young coal is it. The Young coal was opened in a number of places and shows from 21 to 28 inches of coal. There is a large area on the lower part of this creek underlain by this coal if it should prove to be of a workable thickness.

Two thin coals were found between the Young coal and the Fossil limestone, the latter being fairly well developed on the creek. The coals were thin, never over 12 inches in thickness and hence of no economic importance.

The Haddix coal occurring about 10 feet below the Fossil limestone shows a local development on the right fork of as much as 62 inches of good coal. The area underlain by this coal where it is so well developed is uncertain; the natives have been unable to find it in other places. However, this may be due to the fact that the bed is dipping strongly to the north and would not be found at the same elevation on the hillside. Wherever the Haddix was seen in other places on the creek it was thin and poorly developed, having less than 30-inch coal. The greater part of the interval between the Haddix and the Fire Clay coal on this creek is massive sandstone.

The Fire Clay coal is represented by one or more thin coals, none of them carrying a flint fire clay parting or attaining a thickness of over 15-inch coal where seen. On the lower part of the creek the coal is below drainage, but toward the head it comes above on both sides of the fault and in the divide at the head is high in the hills. Below the Fire Clay coal is massive sandstone about 50 feet in thickness, which is fairly persistent over the whole area.

The Whitesburg coal comes above drainage in only one place on the downthrow (south) side of the fault, but on the upper left branches of the left fork, on the north side of the fault, it comes above drainage toward the head of the stream. It showed less than 20-inch coal wherever exposed.

The following is a detailed description of the openings and exposures of the coals on this creek.

On the left, at the mouth of Trace branch, D. F. Williams has an opening into a coal at elevation 845, which is probably the Young coal. It is close to the Caney fault and is dipping at an angle of 10° to the north:

Young Coal

	Feet	*Inches*
Shale	15	
Black bituminous shale		6
Coal		2
Shale		2
Coal		24
Shale floor		
Elevation	845	

About 75 yards above this point the Caney fault crosses, striking north 80° west, and having a throw of about 100 feet.

A massive sandstone coming below the Haddix coal is exposed on up Trace branch for a distance of three-fourths of a mile to the mouth of the first right branch. A section up this branch shows:

Section

	Feet	*Inches*	
Base of the High Rock, Puncheon Creek sandstone cliffs ..... Elevation	1170		
Covered	30		
Bench ..... Elevation	1140		
Covered	80		
Good bench ..... Elevation	1060		
Covered	80		
Opening into the Young coal (section given below) Elevation	980		
Massive sandstone	60		
Blue shale	2		
Hard, blue, arenaceous fossiliferous limestone	1		
Blue shale	2		
Dark-gray, fossiliferous limestone, containing crinoid fragments		6	
Blue shale	10		
Coal		9	Haddix coal
Blue shale	5		
Black slate		6	
Coal		4	
Blue shale	4		
Mouth of branch ..... Elevation	895		

Opening into the Young coal at 980 in the foregoing section, in the head of the right branch, three-fourths mile up Trace branch:

Young Coal

	Feet	Inches
Massive sandstone	10	
Blue shale		18
Coal		20
Shale floor		
Elevation	980	

One and one-fourth miles up Trace branch, up a left branch on William Pelfrey's place, the Young coal shows in the branch at elevation 950, having the following section:

Young Coal

	Feet	Inches
Black slate		8
Coal		4
Shale		½
Coal		3
Shale		1½
Coal		11
Fire clay shale		7½
Coal		9
Shale floor		
Elevation	950	

A piece of pure Hematite ($Fe^2 O^3$) was seen on this branch, which was reported to occur in a bed 18 inches thick about 30 feet above this coal.

A coal taken from the branch near the head of Trace branch is the Young coal. Its thickness could not be ascertained. One-eighth mile up the first right branch of Rockhouse creek in Magoffin county, which is 3½ miles up the creek, a well drilled 50 feet deep was reported to have been drilled through a bed of coal 2 to 3 feet thick, three feet from the bottom. This coal is probably the Fire Clay coal, as this is about its horizon here.

One-fourth mile below the mouth of the first right branch in Magoffin county, up a left drain, Marian Kennard has an opening into the Young coal at elevation 870.

Young Coal

	Feet	Inches
Sandstone	2	
Coal		4
Dark-gray shale		9
Coal		24

This coal bed is dipping at an angle of 9½° north toward the fault which crosses the drain 200 yards farther up. One hundred and eighty feet above the coal the massive High Rock sandstone is seen on the ridge.

A coal opened in two places (now completely caved) up a left branch, 3⅝ miles up Rockhouse creek, at elevation 870, is the Young coal. The evidence of faulting is very striking up this branch, where the Rockhouse fork crosses two-thirds of the distance up.

Up a left branch, 4 miles up Rockhouse creek, no coals were opened. The strata exposed up this branch are on the upthrow side of the fault and hence nearly horizontal. The Fossil limestone found near the head of the branch at elevation 960 could be used to advantage in prospecting for the coals here. A 6-inch coal 3 feet below this limestone is the Haddix coal or a split of that bed.

A section up the left branch of a left branch 4⅜ miles up Rockhouse creek shows:

Section

	Feet
Covered from top of hill to ....Elevation	986
Massive sandstone	15
Covered	5
Opening into the Young coal ½-mile up on the right ....Elevation	966

Young Coal

	Feet	*Inches*
Shale	5	
Coal		29
Shale floor		
Covered	35	
Coal taken from the bed of the branch..Elevation	931	
Covered	15	
Massive sandstone	10	
Thin coal { Coal .... 6" Shale ... ¼" Coal .... 2" } Trace Fork coal..Ele.	903	
Shaly sandstone, partly covered	42	
Elevation of the mouth of the branch	861	

A section up the main left branch, 4⅜ miles up Rockhouse creek, shows:

Section

	Feet
Top of the ridge in the road over to Williams fork ... Elevation	1231
High Rock and Puncheon Creek sandstone	85
Covered	30
Coal bloom—Flag coal Rider ... Elevation	1096
Covered	25
Bloom of the Flag coal ... Elevation	1075
Covered	30
Shaly sandstone	5
Covered	15
Coal bloom—Hazard coal ... Elevation	1021
Massive sandstone	40
Covered	15
Coal—Whittaker coal or upper split of the Young coal ... Elevation	966
Covered	20
Coal—lower split of the Young coal ... Elevation	946
Covered	15
Massive sandstone	50
17-inch blue, fossiliferous limestone, containing crinoid fragments—fossil limestone ... Elevation	881
(This goes under-drainage at the forks of this branch.)	
Blue shale	15
Covered	25
Elevation of the mouth of the branch	836

Up the right fork of this branch two coals show the section given below:

Section

	Feet	*Inches*
Massive sandstone	20	
21-inch coal ... Elevation	991	
Fire clay		12
Massive sandstone	24	
12-inch coal ... Elevation	966	
Clay shale	3	

The strata up the fourth right branch, 4¾ miles up Rockhouse creek, rise faster than the stream for half its length, hence the rocks exposed near its mouth are geologically higher than those farther up. A section made on this stream shows the Haddix and Fire Clay coals:

Section

	Feet	Inches
Massive sandstone	20	
Bluish shale	20	
Ferrifferous limestone concretions		2
Blue shale	2	
18-inch+ coal—Haddix		
Covered	15	
Massive sandstone	45	
Fire clay coal on the right, half way up the stream.		
Massive sandstone		
12-inch coal ....Elevation	941	
Shaly sandstone	5	
Stream level		

Above the point where the coal representing the Fire Clay coal is exposed the dip is not so great and the above section goes under drainage. It also goes below drainage in going down the branch, the 20 feet of sandstone at the top of the section being in the bed of the creek at the mouth of the branch. At the head of this branch the Puncheon Creek sandstone is exposed in two high cliffs known as the "High Rocks". The lower or High Rock sandstone forms only a small cliff here. The elevation of the base of these cliffs is 1330 A. T.

RIGHT FORK OF ROCKHOUSE

Elevation of mouth, 878.

One hundred yards below the mouth of a left branch, three-fourths mile up the right fork, a coal at the horizon of the Fire Clay coal shows the following section:

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Coal		8
Shale		3
Coal		5
Elevation	903	

A strong dip to the northwest is seen here.

Up the left branch, three-fourths mile up the right fork, the Haddix coal is opened in a number of places by Ben Montgomery. The section of the openings numbered as going up the branch are as follows:

No. 1—One-eighth mile up on left. Section at the face of a 20-yard entry:

Haddix Coal

	Feet	*Inches*
Sandstone	5	
Coal		62
Shale floor		
Elevation	978	

No. 2—Two hundred feet farther upstream. Measurement, 8 yards in a 15-yard entry:

Haddix Coal

	Feet	*Inches*
Sandstone	4	
Coal		13
Shale		½
Coal		1½
Blue shale		2
Coal		48
Elevation	978	

No. 3—In a little drain 100 feet up branch. Face of a 5-yard entry:

Haddix Coal

	Feet	*Inches*
Shaly sandstone	7	
Splint coal		10½
Shale		¼
Coal		3½
Blue shale		2
Coal		23
Shale floor		
Elevation	991	

There is a difference in elevation of 13 feet in 100 feet between the first, second and third openings. This is probably due to a slight local fault, as the openings are without doubt into the same coal.

On the right side of the branch and 200 feet farther up is No. 4, and 50 feet farther up Nos. 5 and 6.

No. 4 Haddix Coal

	Feet	Inches
8-yard entry		
Sandstone	8	
Splint coal		3
Shale		¼
Splint coal		7
Shale		½
Splint coal		1½
Blue shale		2
Splint coal		24
Shale floor		
Elevation	998	

No. 5—Shows the same section as No. 4.
No. 6—One hundred feet farther up from No. 5.

Haddix Coal

	Feet	Inches
Sandstone	8	
Splint coal		4
Shale		⅛
Splint coal		5
Shale		½
Splint coal		2
Blue shale		2
Coal		20
Elevation	996	

As seen from the above sections, the coal thins rapidly toward the north. This appears to be only a local thickness of the Haddix and may not extend over much area.

A section from the openings to the mouth of the branch shows:

Section

		Feet
Opening into Haddix coal	Elevation	978
Covered, massive sandstone where showing		38
Massive sandstone		10
5-inch coal	Elevation	927
Covered		4
Sandstone		10
13-inch coal, 2-inch parting. Fire clay coal	Elevation	913
Massive sandstone		9
Elevation of the mouth of the branch		904

From the mouth of this branch to the head of the right fork there is a rapid rise of the strata.

Up a left drain, just below the mouth of the second left branch, Mose Phelps has a 20-yard entry into the Haddix coal at elevation 1037. Its bed section is:

Haddix Coal

	Feet	Inches
Shaly sandstone	15	
Splint coal		9½
Shale		¼
Coal		2
Blue shale		2
Splint coal		25
Shale floor		
Elevation	1037	

A section from the mouth of the branch on which the foregoing section was made, to the head of the right fork of Rockhouse creek, shows:

Section

		Feet
Top of knob on the left of the road	Elevation	1330
Sandstone		50
Coal bloom—Hazard coal (?)	Elevation	1280
Covered		60
Sandstone		30
Covered		20
Massive sandstone		30
Coal bloom—Haddix coal (?)	Elevation	1140
Massive sandstone		35
Covered		10
Thin coal bloom—Fire Clay Rider (?)	Elevation	1095
Shaly sandstone		25
Fire clay coal	Elevation	1070

(Opened on the right up a left branch at the foot of the hill at the head of the fork.) Its section is as follows:

Fire Clay Coal

	Feet	*Inches*
Shaly sandstone		
Coal		5
Shale		½
Coal		14½
Shale		
Elevation	1070	
Massive sandstone	40	
Shaly sandstone	10	
Foot of the hill up which the above section was made		
The section continued downstream shows:		
Sandstone	55	
The rapid dip downstream is the cause of this apparently great thickness of sandstone.		
Blue shale	9	
Whitesburg coal, exposed 1-mile from the head of the fork on the right where a slight fold brings it above drainage for a short distance ...Elevation	956	
Its bed section is:		

Whitesburg Coal

	Feet	*Inches*
Black fissile slate	2	
Coal		7
Blue shale		5

The blue shales coming above the coal are seen in the bed of the creek down to the mouth of the branch in which is the Haddix opening.

LEFT FORK OF ROCKHOUSE CREEK

Elevation of mouth, 878.

The Fossil limestone is exposed, on the right, at the mouth of the first left branch, three-eighths mile up the left fork at elevation 893 A. T.—10 feet above the creek.

A section up the second left branch, three-fourths mile up the left fork, shows the Whitesburg coal:

Section

	Feet
Covered from the head of the branch to ....Elevation	953
Massive sandstone	4
Blue shale	5
Whitesburg coal(?) Opened 1-half mile up the branch on the right ....Elevation	944

Whitesburg Coal

	Feet	Inches
Blue shale		
Black shale	2	
Coal		15
Elevation	944	
Blue shale	15	
Massive sandstone	9	
Shale	3	
Hard, blue impure crinoidal limestone—fossil limestone		8
Blue shale	5	
Elevation of the mouth	904	

That part of the section from the 9 feet of massive sandstone to the mouth of the stream is on the downthrow side of the fault, which crosses about 200 yards up.

A coal 9 inches thick which is exposed on the left of the creek, seven-eighths mile up the left fork, comes just above the Fossil limestone, which goes under drainage a short distance below.

Up the third left branch, 1 mile up the left fork, another thin coal 12 inches thick, which comes between the Young coal and the Fossil limestone, is seen under massive sandstone at elevation 949. On the right of the creek, opposite the mouth of the third left branch, Isaac Montgomery faced up a coal at elevation 984 which showed 21-inch coal. This coal is probably the Young coal, its correlation being somewhat uncertain due to the strata having such a strong dip to the northwest. Seventy feet above this a coal bloom was dug into, but not to solid coal. This coal is probably the Hazard coal.

One-fourth mile up the fourth left branch, 1¼ miles up the left fork, in the bed of the branch at elevation 1000, the Whitesburg coal is exposed:

Whitesburg Coal

	Feet	Inches
Soil		
Black slate		18
Sandstone	2	
Coal		9
Shale		6
Coal		6
Elevation	1000	

A 9-inch coal bed at elevation 941, on the left at the mouth of the first right branch, 1⅜ miles up the left fork, and two thin coals, the upper 8 inches, the lower 12 inches, separated by 4 feet shale, dug from a left drain at elevation 971, 200 yards above the mouth of the first right branch, and again near the head of the creek at elevation 990, where the road goes up the hill, are coals lying above the Fossil limestone and below the Young coal; but they are inclined at such high angles of dip that their correlation is uncertain. The Fossil limestone comes above drainage again one-fourth mile above the mouth of the first right branch at elevation 975.

MINE FORK

Mine fork, a tributary to Little Paint creek, which is indirectly tributary to Big Sandy river, drains an area of approximately 13 square miles in Magoffin county. The principal tributaries to the creek are as follows: Tracey creek, on the left at the county line; Ticklick branch, 1 mile above the county line on the left; Flat fork, 1⅝ miles up on the right; Litteral fork, 2½ miles up on the left, and Twinlick branch, 3 miles up on the right.

About 850 feet of strata are above drainage on Mine fork. The rocks of the New River group are the lowest stratigraphically and hence the oldest rocks above drainage in the county. These rocks are brought above drainage here by the combined effect of the Caney anticline and a lateral extension of the Paint creek uplift which crosses on the lower part of the creek at the mouth of Ticklick branch, forming a small dome known in this report as the Mine Fork dome. For a further account of these structures reference is made to the general description of the structure in the county in the first part of this report. From the Mine Fork dome the strata dip in all directions, being downstream below Ticklick branch and upstream above that branch, also on Litteral fork, Flat fork and smaller streams toward the head of the Main creek. On Lacey creek the dip is upstream as far as and including Brown's fork, but across the stream from the left to the right above that branch. The Caney fault crosses Lacey creek one-eighth mile above Brown's fork and runs parallel with it to its mouth, where it crosses Mine fork. Here the evidence of a fault is very plain. The base of a massive, conglomeratic sandstone is 90 feet above the creek on the right of the mouth of Lacey creek and at the level of the creek on the left, giving a throw of 90 feet to the fault.

The higher strata exposed on the creek are found toward the head of the stream, and on the high knob at the head of Litteral fork, known as Miller's Flag.

Nothing is known of the coals above the Fossil limestone. About 140 feet of strata are found above it at the head of the right fork of Brown's fork and Litteral fork. However, the coals and character of the strata were hidden by soil covering with the exception of massive sandstone, ledges which show in places.

The Fossil limestone was seen on the top of the ridge at the head of Flat fork, Lacey creek and Raccoon creek, and again near the top of the ridge at the head of the creek. Two thin coal stains were found above the limestone, one 15 feet and the other 50 feet. Nothing further is known of these coals. Fifteen to 20 feet below the Fossil limestone the bloom of the Haddix coal was found in a number of places. It is only present near the tops of the highest ridges and was not opened or exposed where a bed section could be made.

Sixty feet below the Haddix coal is the Fire Clay coal, the lower 30 feet of strata being a massive sandstone. This coal, also high in the hills on Mine fork, if present at all, is split into several thin coal seams, coming in an interval of 15 to 20 feet, none of which were seen to be over 9 inches in thickness. The flint fire-clay parting is absent, but at the base of the massive sandstone, which comes above the coal and which is sometimes stained a light yellow color by iron oxide, is a hard, thin crust of hydrated iron oxide (Limonite) about one-fourth inch in thickness.

Forty to 50 feet below the Fire Clay coal (the intervening strata, consisting in most cases of light gray, arenaceous shales) comes the Whitesburg coal. This coal is a valuable horizon marker for this area on account of its 3 to 4 feet of black fissile shale which is characteristic of the bed. It differs from black shale above other coals in that it is very nearly a slate and is denser and more compact. This coal is well up in the hills even toward the head of the stream and is missing from them over a large part of the area on the lower part of the stream. This coal was not opened where it could be measured, but on Pigeon creek and the head of State Road fork it runs from 26 to 36 inches of solid coal, the lower two-thirds consisting of a hard, compact coal, made up of dull and bright bands, there being more of the former than of the latter. The upper one-third is a soft coal and furnishes a sharp contrast with the lower part. This coal occurs 60 feet below the lower break of a prominent bench.

The Gun Creek coal is found on Mine fork 50 to 60 feet below the Whitesburg coal, the interval to that coal being a massive sandstone. This coal is opened in only one place on Mine fork, where it shows 18 inches of coal with a massive sandstone roof. It is high in the hills on the lower part of the creek, but at a much lower level toward the head of the stream.

Next below the Gun Creek comes the Tom Cooper coal. Its interval to the Gun Creek coal on this creek is 40 to 45 feet, consisting chiefly of massive fine-grained, light-colored sandstone with sometimes shale just above and below it and between it and the coals. The bloom of this coal shows in a number of places, but it is only opened in six places, one of which was caved, these being near the head of Mine fork. It shows a maximum thickness of 24 inches and a minimum thickness of 11 inches.

Forty feet below the Tom Cooper coal, and likely to be confused with that coal especially toward the head of the creek, is the Lacey Creek coal. The interval between these two coals is generally sandstone, varying from massive to shaly on different parts of the creek. This coal is the best coal seen on the creek. On Lacey creek it varies from 32 to 24 inches and was not found less than 20 inches of solid coal in thickness. This coal would underlie a large area, especially on Lacey creek and toward the head of the main stream.

The Howard coal is found 40 to 50 feet below the Lacey Creek coal, the interval to that coal being shale in the upper part with sometimes a thin coal 20 feet below the Lacey Creek coal, and massive sandstone, which sometimes becomes shaly in the lower part. This coal is opened in several places to show 18 to 26 inches of coal with from 10 to 24 inches of light shale parting. It is above drainage over most of the Mine Fork region.

Below the Howard coal is from 40 to 45 feet of shaly sandstone, sometimes containing a thin coal about 20 feet below that coal, and again being mostly massive sandstone, below which is the Wheelersburg coal. This coal is opened in a number of places and shows from 22 to 28 inches of coal with two thin partings, sometimes present in the upper 6 inches of the section. This coal would underlie a large area as it is not far above drainage on any part of the creek. The interval from the Wheelersburg coal to the top of the heavy conglomeratic sandstone, a distance of 70 to 90 feet, is soft gray shale, sometimes arenaceous. The 160 feet of conglomeratic sandstone which marks the top of the New River formation is exposed on the lower part of Lacey Creek, Ticklick branch and the main creek up nearly as far as Wheelersburg, standing up in vertical cliffs, with the streams flowing along in the bottom of narrow, cliff-bound valleys.

Immediately beneath this sandstone is the Mine Fork coal, the sandstone itself forming the roof. This coal, from 16 to 18 inches in thickness, is above drainage a short distance up Lacey creek and at drainage level in the main creek just above the mouth of that creek.

No coals were seen in the 90 feet of bluish-gray shales below the conglomerate sandstone exposed on the right at the mouth of Lacey creek.

A detailed description of the openings and exposures on the creek follows.

On the right at the mouth of Lacey creek, the following section shows the Mine Fork coal:

Section

		Feet
Massive, cross-bedded, coarse-grained, conglomeratic sandstone, containing white quartz pebbles, Beaver sandstone		100+
Mine Fork coal	Elevation	830
Bluish-gray, soft shales		90
Creek level at mouth of Lacey creek	Elevation	740

The section of the coal in the foregoing section is:

Mine Fork Coal

	Feet	*Inches*
Conglomeratic sandstone		
Coal		14 to 16
Blue-gray shale		
Elevation	830	

LACEY CREEK

Elevation of mouth, 740.

A strong upstream dip takes the 90 feet of shales and the massive, conglomeratic sandstone below drainage just above the mouth of Brown fork at elevation 850, 1¼ miles up the creek. One-half mile up the creek, on the right where a right drain comes in, the Mine Fork coal is exposed. The section here is:

Mine Fork Coal

		Feet
Massive conglomeratic sandstone		
18-inch coal	Elevation	772
Bluish shales		10
Creek level		

The massive conglomeratic sandstone above the coal is 160 feet thick here.

In the head of the right drain at this point the Wheelersburg coal (No. 1) is opened, its bed section as follows:

Wheelersburg Coal

		Feet
Gray, arenaceous shale		6
22-inch coal	Elevation	1055
Fire clay		1
Shaly sandstone		3

BROWN'S FORK

One and three-eighths miles up Lacey creek on right. Elevation of mouth, 825.

The top of the conglomeratic sandstone is only 25 feet above drainage at the mouth of this fork and goes under drainage only a short distance up. On the right, one-half mile up Brown's fork, Washington Williams has the Wheelersburg coal opened. Its bed section is:

Wheelersburg Coal

	Feet	Inches
Massive sandstone	4	
Gray shale	4½	
Coal		1½
Shale		¼
Coal		4½
Shale		2
Coal		22
Gray shale floor		
Elevation	938	

One hundred yards farther up the creek, up a small right branch, five other entries, two of which could be measured, into the same coal show:

No. 1—On the left of the branch:

Wheelersburg Coal

	Feet	Inches
Massive sandstone	5	
Gray shale	3½	
Coal		4
Shale		¾
Coal		1
Shale		1¼
Coal		22
Shale floor		
Elevation	930	

No. 2—On the right nearly opposite No. 1:

Wheelersburg Coal

	Feet	Inches
Soil	4	
Gray shale	2	
Coal		7
Shale		2½
Coal		21
Elevation	930	

Up the right fork of this fork one-eighth mile this coal is in the bed of the creek at elevation 920.

At the foot of the hill where the road starts up, at the head of the right fork, the Howard coal has been opened on the right of the road. Its bed section is:

Howard Coal

	Feet	Inches
Massive sandstone		
Shaly sandstone	13	
Coal		8
Fire clay shale		18
Coal		9+
Elevation	950	

A section up the hill at the head of the right fork of Brown's fork, along the road, shows:

Section

		Feet
Top of a knob on the right of the road	Elevation	1422
Covered interval with massive sandstone ledges showing in places		110
Bench and coal stain	Elevation	1312
Covered		23
10-inch coal bloom	Elevation	1289
Massive, white sandstone, also showing in ledges		40
Covered		21
Coal stain—Hamlin coal(?)	Elevation	1227
Covered		35
6-inch coal bloom—place of Fire Clay coal(?)	Elevation	1192
Covered		5
Sandstone		10
Covered		114
Coal stain—Cooper coal	Elevation	1063
Covered		9
Massive sandstone		31
Covered—place of Lacy Creek coal		8
Massive sandstone, shaly toward the top		52
Shaly sandstone		13
Howard coal	Elevation	950

The Lacey Creek coal probably comes in the 8 feet of covered interval, although the massive sandstones above and below indicate quite a change in a comparatively short distance in the interval above and below this coal. The thin coal bloom at elevation 1192 is at about the horizon of the Fire Clay coal.

One-fourth of a mile above the mouth of Brown's fork, on the left of Tracey creek, Lewis Howard has the Lacey Creek coal opened. Its section is:

Lacey Creek Coal

	Feet	Inches
Shaly sandstone	8	
Coal		28
Shale floor		
Elevation	982	

This coal bed is dipping strongly toward the northwest, toward the fault which is only a short distance from it.

On the left of Lacey creek, one-half mile above Brown's fork, the Lacey Creek coal is opened by John W. Bailey. Its bed section is as follows:

Lacey Creek Coal

	Feet	Inches
Shale	5	
Coal		30
Shale floor		
Elevation	980	

A coal bed was reported 40 to 50 feet below this coal. This would be the Howard coal.

Up a right branch, one-fourth mile up Lacey creek above Brown's fork, two coals have been dug from the creek; one at elevation 865 showed 18 inches of coal between shales, and the other at 880 was reported to be 23 inches in thickness. It is probable that the one reported 23 inches thick is the Lacey Creek coal and the other the Howard coal, but the rapid dip of 9½° here to the northwest makes their correlation uncertain.

Seven-eighths of a mile up Lacey creek above Brown's fork, up a right branch, the Lacey creek coal opened on Jane Estep's place shows the following section:

Lacey Creek Coal

	Feet	Inches
Shale	4	
Splint coal		30 to 32
Shale floor		
Elevation	940	

On the point on the left at the mouth of this branch is a caved entry into the Lacey Creek coal at elevation 950.

One and one-fourth miles up Lacey creek above Brown's fork, up a right branch one-eighth mile, the Lacey Creek coal is opened by J. F. McKenzie. The opening was partly caved and only the following section could be made:

Lacey Creek Coal

		Feet
Shale	4	
Splint coal		27+
Elevation	911	

Water in opening. 5 inches more of coal was reported.

On the right at the mouth of this drain a coal with the following bed section is exposed:

Howard Coal (?)

	Feet	Inches
Shaly sandstone	10	
Coal		7
Fire clay shale		13
Coal		15
Shale floor		
Elevation	896	

This is probably the Howard coal, the strong dip upstream accounting for the apparently low interval to the Lacey Creek coal.

On the left of the creek, opposite the mouth of the branch on which the foregoing sections were made, a coal 9½ inches in thickness shows between shaly sandstones 9 feet above the stream, at elevation 874. This coal is probably 40 feet below the Howard coal and hence not far above the horizon of the Wheelersburg coal.

One and three-eighths miles up Lacey creek above Brown's fork, up a right drain one-eighth of a mile, L. C. Rigsley has the Lacey Creek coal opened. Its bed section is:

Lacey Creek Coal

	Feet	Inches
Shale and soil	5	
Splint coal		27
Shale		
Elevation	940	

In a right branch one-eighth mile farther up from the foregoing Will Williams has the Lacey Creek coal opened, its bed section is as follows:

Lacey Creek Coal

	Feet	Inches
Arenaceous shale	6	
Coal		26½
Shale floor		
Elevation	959	

Up a right branch, 1¾ miles up Lacey creek above Brown's fork, the Lacey Creek coal, opened by Floyd Russell, shows the following bed section:

Lacey Creek Coal

	Feet	Inches
Shaly sandstone	2	
Coal		24 to 26
Shale floor		
Elevation	965	

One-fourth mile up the main creek, at the foot of the hill where the road goes up, the following section was seen:

Howard Coal (?)

	Feet	Inches
Sandstone	4	
Shaly sandstone	2	
Coal		6
Gray shale		12
Coal		4
Shale	10	
Creek level ....Elevation	940	

A section up the road out of the head of Lacey creek shows:

Section

	Feet
6-inch, hard, impure limestone, containing marine fossils. The fossil limestone ....Elevation	1275
Covered	35
Massive sandstone	40
Slight coal bloom ....Elevation	1200
Shaly sandstone	60
Covered	25
Massive sandstone	25
Covered	15
Sandstone	15
Coal bloom ....Elevation	1060
Covered	70
Massive sandstone	32
Shaly sandstone	8
Howard coal (?) ....Elevation	950
Shaly sandstone	15
Creek level at foot of the hill ....Elevation	935

The Lacey Creek coal should come just above the 32 feet of sandstone in the lower part of the section. The slight coal stain at elevation 1200 is near the horizon of the Fire Clay coal.

Just above the mouth of Lacey creek, in the bed of Mine fork, the Mine Fork coal shows beneath the massive, conglomeratic sandstone, at elevation 745. This sandstone rises in going upstream and 100 feet of it is above drainage at the mouth of Ticklick branch, but above this point the dip reverses and this, together with the rise of the stream, takes it under drainage at Wheelersburg.

One-half mile up a large left branch, one-half mile up Mine fork above the mouth of Lacey creek, the Wheelersburg coal is opened by Leonard Blanton. Its bed section is as follows:

Wheelersburg Coal

	Feet	*Inches*
Gray shale	6	
Coal		20
Shale floor		
Elevation	905	

This bed is dipping strongly to the north at this point.

In the head of the right fork of this branch the Howard coal is opened in two places by Jim Howard. Its bed section is as follows:

Howard Coal

	Feet	*Inches*
Sandstone	1	
Shaly sandstone	3	
Coal		6
Fire clay shale		8
Black bituminous shale		3
Fire clay shale		4
Coal		18
Black slate		3
Elevation	960	

One hundred feet farther up on the same side another opening shows:

Howard Coal

	Feet	*Inches*
Sandstone	4	
Gray shale		18
Coal		6
Fire clay shale		10
Black, bituminous shale		3
Fire clay shale		5
Coal		5+
Mud and water ......Elevation	960	

TICKLICK BRANCH

One mile up Mine fork on the left. Elevation of mouth, 800.

Up the first right drain, one-eighth mile up Ticklick branch, the Wheelersburg coal is opened by J. C. Wheeler. Its bed section is:

Wheelersburg Coal

	Feet	Inches
Gray shale	12	
Coal		23
Shale floor		
Elevation	1005	

The conglomeratic sandstone is exposed in high cliffs up Ticklick branch as far as the school house 1 mile up.

Up a large left branch, three-fourths mile up Ticklick branch and in the head of the right fork of it, is a caved opening into the Howard coal at elevation 1025. One mile up Ticklick branch and one-eighth mile up a left branch a caved opening at elevation 1008 is into the Wheelersburg coal.

A section up the hill at the head of Ticklick branch is as follows:

Section

		Feet
Top of the hill	Elevation	1101
Covered		16
Shaly sandstone		25
Coal bloom—probably a thin coal below the Lacey Creek coal	Elevation	1060
Sandstone		20
Covered		10
Coal stain—Howard coal	Elevation	1030
Covered		35
Shaly sandstone		5
Coal stain—Wheelersburg coal	Elevation	990
Shale and shaly sandstone		25
Foot of hill	Elevation	965

A section from a point 1 mile up Ticklick branch over the ridge along the road to Wheelersburg shows:

Section

	Feet
Top of the ridge .... Elevation	1145
Covered	20
Coal bloom and bench .... Elevation	1120
Covered	45
Heavy-bedded sandstone	20
Covered with shaly sandstone drift	55
Massive sandstone	25
Shaly sandstone, drift covered	25
Covered	30
Heavy-bedded sandstone. Upper part of the conglomeratic sandstone	45
Stream level of Ticklick branch .... Elevation	875

FLAT FORK

One and five-eighths miles up on the right. Elevation of mouth, 810.

Three-fourths mile up Flat fork, up a left drain, a caved opening on the right at elevation 1040 is probably into the Lacey Creek coal.

At the head of Flat fork, up a small right drain at the foot of the hill, Joe Isaacs has the Howard coal opened at elevation 985. Its bed section is:

Howard Coal

	Feet	Inches
Massive sandstone	4	
Coal		4
Fire clay shale		6
Coal		20
Elevation	985	

A thin coal, reported 12 inches in thickness, opened by Floyd Sellers up a right branch one-fourth mile down the fork, at elevation 968, is in the bed of the branch where the road starts up the hill out of the head of Flat fork and is 20 to 25 feet below the Howard coal.

A section up the hill here shows:

Section

		Feet
6-inch, impure limestone; fossil limestone	Elevation	1275
Covered		95
Good bench, place of Fire Clay coal	Elevation	1180
Covered		20
Shaly sandstone		23
Coal bloom—Whitesburg coal (?)	Elevation	1137
Thin-bedded sandstone		25
Coal bloom (?)	Elevation	1112
Covered		2
Massive sandstone		35
Covered		95
Elevation of opening into the Howard coal		985
Covered		25
Coal dug from creek	Elevation	960
Foot of hill		
The section on down the stream to its mouth shows:		
Covered		85
Massive, conglomeratic sandstone		70
Mouth of creek	Elevation	805

A section made in going up the hill along the road from Wheelersburg to Ticklick branch shows:

Section

		Feet
Top of hill	Elevation	1145
Covered		25
Coal bloom—Gun Creek coal (?)	Elevation	1120
Massive sandstone		35
Blue shale		15
Slight coal bloom—Tom Cooper coal	Elevation	1060
Covered		35
Coal bloom and bench—Lacey Creek coal	Elevation	1025
Massive sandstone		35
Covered—place of Howard coal		15
Massive sandstone		20
Shale-drift, covered		15
Bloom of the Wheelersburg coal	Elevation	940
Gray shale		20
Covered		50
Heavy-bedded, fine-grained sandstone, upper part of the conglomeratic sandstone		45
Creek level	Elevation	825

MINE FORK ABOVE WHEELERSBURG

One hundred and fifty yards below the mouth of Litteral fork and 200 yards up a left hollow on the left side the Wheelersburg coal gives the following section in a 25-yard entry:

Wheelersburg Coal (No. 1)

	Feet	*Inches*
Light, sandy shale	2	
Dark-gray shale		5
Black shale with coaly matter		4
Block coal { 10" soft coal 13" harder coal		
Elevation	938	

At this locality there are two adjacent openings. Farther up this hollow are two more openings into the same bed. There is no prominent bench just above or below the horizon of this coal. The Wheelersburg bed has been opened nowhere else on upper Mine fork. Its bloom has been found, but the bed appeared less than 20 inches thick.

LITTERAL FORK

Litteral fork empties into Mine fork on the left at Wheelersburg. There are numerous openings on Litteral fork, all those now worked, with one exception, being into the Lacey Creek coal.

The first opening on Litteral fork is a 40-foot entry into the Lacey Creek coal, by Robert Griffith, on the first left branch of Litteral fork, one-fifth mile up the branch on the left of the second right drain. The bed section here is as follows:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	5	
Hard, splintery block coal		28
Gray shale		2+
Elevation	1200	

A pronounced roll in the floor and roof is found here. This bed has been opened again in the same branch, one-fourth mile up the left fork at elevation 1215. The opening is now caved.

At the head of a right-hand branch, which is opposite the second left-hand branch, Charles Wheeler has a completely caved opening, at elevation 1196, into a bed believed to be the Gun Creek coal. The roof only shows.

On this same branch, 200 yards from the mouth, on a left drain, Charles Wheeler has a prospect, now caved, into the Lacey Creek coal, reported to be 18 inches thick, elevation 1015. Just below this point, at elevation 981, is a reported coal bed. This bed was said to be one foot thick, but could not be seen. Its interval of 35 feet to the Lacey Creek coal would place it at the right horizon for the Howard coal.

One hundred and fifty yards up Litteral fork on the right, on the spur between this branch and the next right branch, Charles Wheeler reported a digging into a bed said to be 12 inches thick, at elevation 926. This is the Wheelersburg coal.

One-fourth mile up the next right branch, in a small right drain, Paris F. Long has a completely caved opening into the Lacey Creek coal bed, reported to be 24 inches thick. Elevation, 1010.

On the spur opposite the third left branch and 150 yards above the lower right branch Paris F. Long has a caved wet entry, showing the following bed section:

Lacey Creek Coal

	Feet	*Inches*
Shaly sandstone	6	
Black, bituminous shale		8
Hard block coal		25½
Elevation	995	

Two other openings here by Paris F. Long are into the same bed, one 25 feet below this opening and completely caved; and another 15 feet above it. The latter was measurable and gave 25 inches coal.

Green Rice has a completely caved opening into the Lacey Creek coal 125 feet up on the same side. The Lacey Creek coal is opened by a number of entries in a small left gully between the third and fourth left branches. One hundred and fifty yards up this gully L. M. Wheeler has a 60-yard entry, showing the following bed section:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	15—20	
Black shale		4
Coal		26
Elevation	1000	

Immediately to the left of this opening is an abandoned entry, also by L. M. Wheeler, which was probably driven in more than 30 yards.

In this gully, 100 feet up on the right fork, Green Rice has two adjacent openings into the Lacey Creek bed driven in about 10 yards. On the other side of the stream and 20 yards up three adjacent shallow entries have been made.

One hundred feet below this gully and on the left bank of the main stream a coal bloom occurs at elevation 917. Just above this bed is some black slate (shown by float), and over this gray shale. This coal bloom is the Wheelersburg bed.

The Lacey Creek coal is again opened in a 25-yard entry on the land of John M. Blanton, on the spur between the third and fourth left branches, 200 yards below the mouth of the fourth left branch. By leveling across the main stream this opening showed to be 5 feet higher than the Paris F. Long openings mentioned above. The bed section here is:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	4	
Gray, sandy shale, bituminous in lower part	2	
Black bituminous shale		12
Coal		25½—26
Hard, gray shale		2+floor
Elevation	1005	

On the spur between the opposite right branch and the next right branch above Green Rice has two completely caved openings. By leveling these were shown to be 3 feet higher than the Blanton opening mentioned above.

Ten feet downstream from the opening of John Blanton, where the bed section was obtained, is a 35-foot entry belonging to Green Rice. Within 20 feet upstream of Blanton's entry are two abandoned entries. All these openings into the Lacey Creek coal showed the same bed section as the one here given. Two hundred yards up the fourth left branch, on the left, John M. Blanton has a completely caved opening into the Lacey Creek coal at elevation 998.

Further up Litteral fork Daniel Conley has a 25-yard entry into the Lacey Creek coal, on a left branch one-fourth mile below the head of Litteral fork, 100 yards up the branch on the right side. The bed section here is:

Lacey Creek Coal

	Feet	Inches
Massive sandstone	2	
Coal		25
Floor—black, soft,, bituminous shale		1+
Elevation	995	

Fifteen feet vertically below this opening, at the upper mouth of this branch, a 5-inch bed of coal shows under a 3-foot, shaly sandstone stratum. This bed is identified with the thin coal often found elsewhere 10 to 15 feet below the Lacey Creek coal. About 200 yards below the head of Litteral fork the Lacey Creek coal goes under drainage.

At the head of Litteral fork, 150 yards up a small left fork back of his house, W. M. Ferguson has a 15-yard entry, a room being opened up by four adjacent openings into the Gun Creek coal:

Gun Creek Coal

	Feet	Inches
Massive sandstone	3	
Coal		19
Light, sandy shale		2+
Elevation	1096	

This bed has a local reputation of being the best burning coal in this vicinity. It is a hard, splint and black coal.

Seventy-five yards down this branch, on the left, W. M. Ferguson has a completely caved opening into the Whitesburg coal. This opening occurs at the upper break of a small bench and fragments of black slate were found in the dump. The elevation of this opening is 1149.

The top of the conglomeratic sandstone goes under drainage on Litteral fork at elevation 855, about one-third mile up the fork. The Wheelersburg coal goes under drainage at about elevation 912, one-half mile from the head of Litteral fork. The Lacey Creek coal goes under drainage at elevation 990, about 150 yards below the extreme head of Lacey creek. All coals shown above the Lacey Creek coal are above drainage throughout Litteral fork.

On the first small right branch above the mouth of Litteral fork and below the mouth of Twin Lick, E. E.

Caudill has opened the Tom Cooper coal in two places. One opening into this bed is 100 yards below the head of the branch on the left. A 15-foot wet entry here gave the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, sandy shale	3	
Bituminous shale		12
Coal		21±
Elevation	1040	

The lower 8 inches of the coal was under water.

There is another opening into the same bed by E. E. Caudill 150 yards below this opening on the same (left) side. A 20-foot entry, wet and caved, here shows the coal with the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, sandy shales	2	
Black, slaty shale		12±
Coal		21
Elevation	1040	

In a small left gully between the mouth of the last-mentioned (Caudill) branch and the mouth of Twin Lick and in the mainhead of this gully, Jim Wheeler has an opening, completely caved, into the Tom Cooper coal. Elevation of opening 1045.

TWIN LICK

Twin Lick is the first large right branch of Mine fork above Wheelersburg. Its mouth is one-third mile above Wheelersburg.

On the first right branch of Twin Lick, about 150 yards up, on the right, in the first right drain just above the first house on the branch, Mrs. A. E. Caudill has an opening into the Lacey Creek coal. The bed section here is:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	4	
Soft block coal		23
Floors—light-gray, clay shale		2+
Elevation (believed to be high)	1043	

There is a completely caved opening at elevation 1067 into a bed which is probably the Tom Cooper coal. The high elevation is probably inaccurate. The location is at the head of this branch, on the left, on land of Fred Phipps. This elevation and the other one on this branch may well be off as much as 20 feet. Atmospheric changes were very rapid during work on this branch.

Continuing up Twin Lick, 200 yards up the branch, at elevation 873, 5+ feet of dark-gray, concretionary shales show in the bed of the stream. These belong to the shale series lying between the top of the conglomeratic sandstone and the Wheelersburg coal.

Half-way between the first and second right branches on Twin Lick, on the left, Levi Howard has a completely caved opening into the Lacey Creek bed at elevation elevation 1029. The coal was reported to be thin. From fragments seen in the dump, the roof appears to have been largely hard, brown, shaly sandstone.

Directly opposite this Howard opening, on the right bank of the main stream, a thin coal bloom shows at elevation 921. This is the bloom of the Wheelersburg coal.

Roe Taggart has two adjacent openings, 80 feet apart, into the Tom Cooper coal, in the next right hollow, just below the head. The downstream one of the two gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	2	
Soft black shale		1—2
Block coal		22—24
Gray, clay shale		½
Light-gray to white clay shale		1+
Elevation	1032	

These openings are higher than the caved Howard opening. Fifteen to 20 feet below this opening is a 25-foot ledge of sandstone.

At the mouth of the next left-hand branch (the first left branch of any size) coal has been raised at stream level. While not measurable here, this bed 200 yards further up, at the mouth of the second right branch below the head of Twin Lick, showed 12 to 13 inches of block coal. This is the bloom of the Wheelersburg coal.

One hundred and twenty yards up the first left drain, on the right, Roe Taggart has two adjacent wet entries 15 feet apart into the Tom Cooper coal. A bed section here shows:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	1	
Black sandy slate		30
Soft block coal		21
Light-gray, clay shale		1+
Elevation	1044	

It has an interval of 123+ feet to the Wheelersburg coal with a fall of strata from the Wheelersburg bloom to the openings into this bed.

At the mouth of this drain, at elevation 975, a 6-inch bed of coal was found under 6 inches of light-gray, sandy shales, with 10 feet below the coal bed thin, well-bedded, dark-gray sandstone. This bed is the Howard coal.

At the mouth of the second large right branch below the head of Twin Lick, considerable coal has been raised from the stream bottom by Jesse Howard. This coal is the Wheelersburg coal. The bed section here is:

Wheelersburg Coal

	Feet	Inches
Massive sandstone	15	
Covered	10	
Soft, gray clay shale	3	
Block coal		12—13
Elevation	921	

Two hundred and fifty yards from the head of this branch, on the right and just above his house, Jesse Howard has a prospect into the Lacey Creek coal:

Lacey Creek Coal

	Feet	Inches
Light-gray, clay shale	1	
Coal		1
Bituminous clay shale		2
Coal		1
Light-gray clay shale		4
Block coal		19
Light-gray clay shale		1+
Elevation	1006	

The Tom Cooper coal is opened by Jack Conley on the last right-hand branch of Twin Lick, 200 yards from the mouth, on the left. A 12-foot entry gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Light, sandy clay shale	4	
Black shale, grading into bituminous sandy shale at top	3	
Block coal		24
Light-gray clay shale		1+
Elevation	1058	

This bed occurs well up on a fairly well developed bench.

The Lacey Creek coal is opened at the head of the left fork of Twin Lick, 200 yards from the main head. A prospect by P. Adams here gives the following bed section:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	7	
Coal		2
Light-gray clay shale	1½	
Coal		3
Light-gray clay shale		20
Coal		8
Elevation	1006	

It will be noted that this bed and the one prospected at Jesse Howard's show the Lacey Creek coal very much split by partings. This splitting of the bed, accompanied by thinning, continues on Lick creek and State Road fork of Licking river.

The Tom Cooper coal is opened in a 20-yard entry by Marion Hale on a small left branch back of a house one-half mile above the mouth of Twin Lick. The opening is 100 yards up the branch on the right of a right drain:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	2	
Sandy, black shale	2	
Block coal		22½
Light-gray clay shale		2+
Elevation	1001	

Below this opening a massive sandstone ledge shows at from 981 to 951 elevation. This bed is again opened by Marion Hale at the left head of the right branch, directly opposite the above-mentioned branch. The bed section here gives:

Tom Cooper Coal

	Feet	Inches
Massive sandstone		
Block coal		23
Light-gray clay shale		2+
Elevation	1003	

This bed is opened by 3 adjacent entries in 100 feet. The entries are driven in 20 yards and broadened out into a room. Considerable coal has been removed from this locality.

One-fifth mile up Mine fork above these openings a large right branch enters Mine fork by elevation mark 872. On a small right gully 50 yards up the left fork or main stream and 40 yards up the gully, Marion Hale has a completely caved opening into the Tom Cooper coal at elevation 998.

RIGHT FORK OF MINE FORK

Elevation of mouth, 872.

The Tom Cooper coal is opened on the first right branch of this fork, one-fourth mile up this branch and 150 yards up a right hollow, at the head. A prospect by L. H. Burke here gives this bed section:

Tom Cooper Coal

	Feet	Inches
Light, thin-bedded, sandy shale	2½	
Bituminous shale		12
Splint coal		11
Elevation	1049	

Directly across the branch from the mouth of this hollow is a completely caved opening 10 feet lower than the opening at 1049. Coal here was reported as 28 inches, which was probably a mistake, as it is the same bed as the one measured which gave 11 inches.

Two hundred yards further up the fork is a branch on the right, from which Oscar Wheeler has raised coal. The bed occurs at stream level and has a black slate roof. The thickness of this bed could not be obtained, but it was probably less than 18 inches. This is the Howard coal at

920 elevation. Oscar Wheeler has a caved opening, at elevation 1014, into the Tom Cooper bed 80 yards up a small left drain which is 100 yards above the right branch mentioned above. Fragments of black slate were found in the dump.

At the head of this fork, on the left, the bloom of the Tom Cooper coal shows in natural exposure 5 feet over a massive sandstone ledge:

Tom Cooper Coal

	Feet	Inches
Black shale	10	
Block coal		10
Elevation	1014	

A combined section for this fork is as follows:

Section

	Feet
Bench	
Covered interval	15
Slip and spring—probably the horizon of a coal bed.	
Covered interval	45
Prominent bench	
Covered interval	35
Slight bench	
Covered interval	45
Small bench	
Covered interval	5
Massive sandstone ledge	12
Covered interval—probably sandy shale	
Tom Cooper coal—10-inch thick on a small bench	
Sandy shale	5
Massive sandstone	42
Covered interval, largely gray shale—place of Lacey Creek coal	
Massive sandstone—forming ledges	35
Covered interval, probably shale	5
Howard coal	

The Tom Cooper coal is opened on main Mine fork, 100 yards above the Right fork, up the first left branch on the left, in a completely caved opening by P. Adams. Black slate and gray clay shale show on the dump and probably were from the roof of the bed. The elevation of the opening is 1012.

A strong upstream dip is shown by a caved opening into the same bed, also by P. Adams, 60 yards up the branch on the same side. The elevation of the Lacey Creek coal is here 1002, a fall of 10 feet in 60 yards.

This portion of Mine fork forks again about one-third mile up, at elevation mark 904. The county road to State Road fork of Licking river turns up the right fork at this point. The Tom Cooper coal is opened by Horsford Conley 200 yards up this fork, on the left, 10 feet above the stream. The following bed section was obtained here:

Tom Cooper Coal

	Feet	*Inches*
Block coal		7½
Massive sandstone		18
Black slate		18
Block coal		16½
Hard, light-gray shale		
Elevation	990	

Section made on the road leading from Mine fork to State Road fork:

Section

		Feet
Summit of divide at elevation mark 1236 on the road		
Coal bloom—low split of Young coal	Elevation	1235
Interval—sandstone and shaly sandstone		52
Coal float, probably near the level of the Trace Fork coal	Elevation	1183
Fossil limestone		
Covered interval, probably shaly sandstone		5
Fine-grained, massive sandstone		4
Covered interval		18
Haddix coal bloom	Elevation	1162
Massive sandstone		23
Covered interval		17
Fine-grained, hard, massive sandstone		7
Covered interval		37
Coal bloom appears to be that of a bed less than 20 inches thick with a black shale roof—Whitesburg coal	Ele.	1075
Massive sandstone		45
Coal streaks cross-bedded at the base of a massive sandstone bed—horizon of Gun Creek coal.		
Covered interval		
Shaly sandstone float		60
Small bench		
Covered interval		7

The interval between coals may be too small owing to a dip into the divide here. The opening into the Tom Cooper coal up this branch is 85 feet nearly directly below the Whitesburg coal.

LEFT FORK OF MINE FORK

For about a hundred yards above the mouth of the right fork dark-gray shales, with small calcareous concretions, show in the stream bed from elevation 900 to 910. Coal float was seen in the bottom and on the banks of the stream here and it appeared as if a coal bed, probably thin, had been dug out of the bed of the stream. No sign of coal in place could be found. If a coal bed occurs here it would be at about the stratigraphic position of the Howard coal, as a short distance farther up this fork the Tom Cooper bed is opened at 985 elevation. The Tom Cooper coal has been opened by Zed Cheek 100 yards up the second left branch on this fork. The bed section here is as follows:

Tom Cooper Coal

	Feet	*Inches*
Shaly sandstone	2	
Coal		25
Hard, compact, gray shale		
Elevation	985	

There are here three adjacent openings, two of them caved. All three openings are within a distance of 80 feet.

One hundred feet up the branch and also on the left another opening into the same bed gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, heavy-bedded sandy shale	1	
Black slaty shale		14
Block coal		23
Dark-gray shale		2+
Elevation	995	

There is a strong dip down the branch. This coal bed rises 10 feet in 100 feet as followed up the branch.

The following section was obtained on this branch:

Section

	Feet
Coal bloom and lower break of a slight bench (coal between Tom Cooper coal and Gun Creek coals. Ele.	1055
Light-gray shale and shaly sandstone	50
Horizon of large 2+foot concretions with Septaria markings	
Light-gray clay shale	15
Lacey Creek coal ... Elevation	985—995
Shaly sandstone	5
Massive sandstone	15

The Tom Cooper coal has again been opened 100 yards up the fork. This opening, by Hailey Conley, is now completely caved. The bed here lies just above a

12-foot ledge of massive sandstone. Thirty feet upstream from this caved opening a 12-foot entry, also by Hailey Conley, gives the following bed section:

Tom Cooper Coal

	Feet	Inches
Shaly sandstone	4	
Hard, black shale		15
Hard, splintery block coal		21—
Elevation	956	

The lower part of the bed was in mud and could not be reached.

Sixty feet up on the same side is a completely caved opening into the same bed. Forty feet further up Hailey Conley has an opening into the Tom Cooper coal with the following bed section:

Tom Cooper Coal

	Feet	Inches
Black shale near a slate		
Hard, splintery block coal		27
Hard, medium gray shale		

The coal of this bed appears to be of excellent quality. It is a very hard, splintery block coal—probably in part splint coal.

This fork has two small forks one-fourth mile from the extreme head. In a right drain at the mouth of the left fork is an old, completely caved opening into the Whitesburg coal at elevation 1100. It was reported to be 20 inches thick. Blocks of black slate 6 inches in thickness were found in the dump.

LICK CREEK

Elevation of mouth, 787.

There are comparatively few coal beds opened on Lick creek, due to the fact that the coals near drainage on this creek and which therefore have the largest areas are beds below the Whitesburg and above the Wheelersburg coal and are all thin, never being found with over 30 inches of recoverable coal.

Near the mouth of Lick creek is an opening into the Fire Clay coal, which shows 43 inches of coal, but with 15 inches of parting, including 4 to 5 inches of flint fire clay. This is the thickest coal seen in the area drained by Lick creek.

The lowest strata on Lick creek are found at the head of Raccoon creek near the forks, where the Howard coal is above drainage. The highest strata occur at the mouth of Lick creek, where the Fire Clay coal has an elevation of 935-940. Only one opening was found into the Young coal. This opening was at the head of Rocklick branch of Raccoon creek and was caved and wet. The thickness of the coal was 26 to 30 inches—not more than 30 inches.

The bloom of the Haddix coal, which shows a good bed section on Mash fork, is found here, but has not been opened. There is evidence of a thinning and a splitting of this bed in the area drained by Lick creek. It is not thought that this bed will be found over 30 inches thick, and probably nearer 20 inches. It may at times be at least part cannel. The Colvin cannel coal of Colvin branch of Licking river, which is correlated with the Haddix, is but a short distance from the lower part of Lick creek. On Colvin branch it is of good thickness and excellent quality, but thins rapidly apparently in every direction from Colvin branch.

In that portion of Lick creek nearest Rockhouse the Haddix coal may be found—very pockety—at times reaching 40 to 50 inches in thickness, but the very variable character of this bed, the very limited area of its thick portions and its position well up on the hills here, would hardly justify any commercial development. The prospest for a workable coal bed on Lick creek of any area is not good.

COALS OF THE AREA DRAINED BY LICK CREEK

The coals will here be described in succession, beginning with the highest in the section. The nature of the sedimentary rocks making up the intervals between the coals can be seen in the generalized stratigraphic section for Lick creek.

FLAG COAL RIDER

On the high knob, 1¾ miles above the mouth of Lick creek, on the left, the Flag Coal Rider is naturally exposed. This bed is here 12 inches thick with 6½-inch parting. Directly overlying this bed is a 110-foot cliff of massive sandstone, which appears to represent both the High Rock and Puncheon Creek sandstones.

FLAG COAL

At the same locality, 20 feet below the Flag Coal Rider, is a completely caved prospect into the Flag coal. The interval between the Flag coal and the Flag Coal Rider is largely massive sandstone, which is distinct from the sandstone lying over the Flag Coal Rider, being fine-grained and harder. The Flag coal was reported to be 2 feet thick here. The interval to the Fire Clay coal is 270 feet. Neither the Flag coal nor the Flag Coal Rider will have any area on Lick creek.

HAZARD COAL

The bloom of the Hazard coal has not been found on Lick creek. From its occurrence in closely adjacent territory it should come near the summits of the highest hills in those portions of Lick creek where the Fire Clay coal has a low elevation. The interval to the Fire Clay coal should be about 235 feet. The Hazard coal would be too high on the hills to have any considerable area.

WHITTAKER COAL

A coal 40 feet over the Young coal has been opened (the opening is now completely caved) at the head of the right branch of Lick creek, up which the trail goes from Lick creek to Salyersville. The interval to the Fire Clay coal is here 205 feet. There is a fairly persistent coal bed at this horizon. This bed has also been opened on Cripple creek of Licking river.

YOUNG COAL

The Young coal on Lick creek comes 155 feet over the Fire Clay coal and 70 to 75 feet over the place of the Fossil limestone. This coal has but small area on Lick creek. It has been opened only once, near the head of Rocklick branch of Raccoon creek, where it has a thickness of 30 inches. It is probably nowhere of greater thickness than 30 inches and probably will generally be found about 24 to 26 inches thick on the average. On Rockhouse creek Browning reports this coal 20 to 28 inches thick.

TRACE FORK COAL

Two thin coals are found 6 feet apart and 15 to 20 feet above the place of the Fossil limestone, at the head of Lick creek. The bloom of these coals (there were no openings into them) appeared to be of thin coals and they are of no economic importance.

FOSSIL LIMESTONE

This limestone is found only in small patches on the divide against which State Road fork of Licking river, Mine fork and Lick creek head. Through much of the area the Fossil limestone seems to be replaced by massive sandstone.

HADDIX COAL

The Haddix coal is not exposed on Lick creek. Its bloom is found 65 to 70 feet above the Fire Clay coal and 10 to 15 feet below the Fossil limestone. It may be found locally up to 35 inches thick on Raccoon creek, but would probably have so little area on the hills as not to justify prospecting.

HAMLIN COAL

A coal which occurs in this region 40 to 45 feet above the Fire Clay coal is tentatively correlated with the

Hamlin coal of Mr. J. M. Hodge's reports on the coals of the North fork of the Kentucky river. In one place the interval above the Fire Clay coal was as low as 25 feet. This bed has been found opened and measureable in only one place—at Judge Cooper's, near the head of Lick creek, where the coal is 18 inches thick. On Brushy fork of Lick creek this bed was opened. The openings were reported to have shown 3 feet of coal, but are now completely caved. This reported thickness is thought to be excessive. This bed occurs either directly over, as is usually the case, or within a short distance of the top of the massive sandstone which usually overlies the Fire Clay coal. The Hamlin coal will probably not prove to be of economic importance in the Lick Creek region.

FIRE CLAY RIDER

The Fire Clay Rider was not found in this region, but in a section made by the Kentucky Geological Survey on Lick creek between Raccoon and Buffalo creeks, on the land of Henry Howe, and given in the detailed section to follow, a coal was found at the horizon of the Fire Clay Rider 20 feet over the Fire Clay coal. The bed was reported to be thin and with more parting than coal. This bed will obviously not be of economic importance.

FIRE CLAY COAL

The Fire Clay coal is everywhere above drainage in the Lick Creek region, but in the upper portion of Lick creek and on the left-hand tributaries the bed lies so high on the hills as to have little area. At the head of State Road fork and at the head of Lick creek the Fire Clay coal bed is badly split. Three or four thin beds, less than 8 inches thick, are scattered through 15 feet of strata and represent the Fire Clay coal here. Besides being badly split the bed also loses its characteristic flint fire-clay parting in this portion of Lick creek.

On the first right branch below the head of main Lick creek the Fire Clay coal has been opened and shows 19 inches of coal underlain by 6 inches of impure flint fire clay. This bed is not exposed on Brushy, Buffalo or Raccoon branches of Lick creek.

On Rockhouse creek, north of Lick creek, Browning reports the Fire Clay coal also split and valueless and with the flint fire-clay parting lacking. From just above the mouth of Buffalo branch to the mouth of Lick creek the Fire Clay bed is quite frequently opened. The average thickness of the bed here is 30 inches. Thicknesses up to 42 inches occur, but in these instances the bed is badly parted. In the above mentioned region the bed shows its usual characteristic flint fire clay parting. It is in this last-mentioned portion of Lick creek only that the Fire Clay coal may be of economic importance. The bed is frequently characterized by having a massive sandstone ranging from 15 to 40 feet in thickness shortly over it.

THE WHITESBURG COAL

The Whitesburg-Fire Clay coal interval is 35 to 60 feet on Lick creek. The interval is largely made up of clay shale with three or four thin beds of massive sandstone. The Whitesburg coal is everywhere above drainage on Lick creek and is the best of the coals underlying any considerable area in this region. Locally the Fire Clay bed and a bed at about the Fire Clay Rider horizon and the Young coal are thicker, but these beds have not the area nor do they hold their thickness as well as does the Whitesburg coal.

The Whitesburg coal wherever opened or exposed is always below 30 inches thick. Its maximum thickness on Lick creek is 29½ inches of coal with 1 inch of parting. This bed section is found at the head of Brushy branch of Raccoon creek. There will be but small areas, if any, where this bed is 30 inches or more thick. It will be found at its maximum thickness at the heads of Raccoon, Buffalo and Lick creeks.

The Whitesburg coal in this area always has a heavy, black, fissile shale roof. This black, slaty shale ranges from 18 to 36 inches.

Another very constant feature of the Whitesburg bed in this area is the nature of the bed section. The bed is everywhere without parting and the lower two-thirds of the coal is a very hard, block coal made up largely of a hard, dull coal interlaminated with a lustrous, softer coal like that which forms the upper third of the bed. This bed is easily confused with the Tom Cooper coal bed in the Lick Creek area, since they both have decided and persistent black shale roofs and often are of about the same thickness. The black shale roof of the Whitesburg coal is generally thicker (in most cases over 2 feet thick) and is a harder, denser shale--more nearly a slate--than is the roof of the Tom Cooper bed. The black, shale roof of the Tom Cooper coal averages less than 12 inches thick. The nature of the coal of the Tom Cooper bed is different from that of the Whitesburg bed. It is usually a soft, lustrous block coal without the hard, dull coal which characterizes the basal portion of the Whitesburg coal.

GUN CREEK COAL

The interval between the Gun Creek coal and the next higher bed—the Whitesburg coal– is 45 to 60 feet on Lick creek; with an average of 50 feet. This interval consists largely of a massive, light-colored, fine-grained sandstone.

The Gun Creek coal is a thin, non-workable bed in the Lick Creek area. Though it is above drainage throughout Lick creek it is not known to have over 23 inches of coal and is usually much thinner than this, and is therefore of no interest from an economic standpoint. It is thickest on Lick creek between the mouth of Buffalo and Raccoon creeks, where it is under a massive sandstone, which constitutes the usual roof of the bed in this region.

TOM COOPER COAL

This coal has an interval of 40 feet to the Gun Creek coal. It may be distinguished from the Gun Creek and the Whitesburg coals by being usually, if not always in this region, overlain by 10 to 15 feet of concretionary, soft-gray shales. There is no prominent development of such shales above the Gun Creek or the Whitesburg coals.

This bed has good area on Lick creek. It is above drainage on Raccoon creek from the head to near the mouth. It goes under drainage one-fourth to one-half mile up Rocklick branch of Raccoon creek. It is everywhere above drainage on Buffalo creek and on Brushy fork. On main Lick creek it is above drainage from a point one mile below the head (where it goes under drainage just below the upper trail from State Road fork of Licking river to the head of Lick creek) to the mouth of Lick creek at Bloomington. It is, however, so near the stream level of main Lick creek throughout its course that it soon goes under drainage on the small side branches.

This coal is found above drainage on the main left-hand branches of Lick creek for a considerable distance upstream, this being caused by a downstream dip in many places as great as the fall of the stream. The left-hand branches, generally speaking, flow down the south flank of the Caney anticline. The occurrence of this coal at or near drainage for some distance is exemplified by its occurrence on Raccoon, Buffalo and Brushy branches of Lick creek.

The Tom Cooper coal ranges in thickness from 12 inches at Bloomington, near the mouth of Lick creek, to a maximum of 27 inches near the head of Buffalo creek. The coal of this bed is in nearly all instances solid. It has a fissile, black, shale roof, averaging 20 inches thick, which is overlain by a thin, massive sandstone.

The Tom Cooper coal is the typical branch coal of Lick creek. Coal from this bed has been raised from the bed of the stream in nearly every branch, especially those on the left of Lick creek. So far as the evidence goes it is hardly of sufficient thickness to be of commercial importance and will almost certainly not be found over 29 to 30 inches in thickness.

LACEY CREEK COAL

The Lacey Creek coal comes 35 feet above drainage in this district only over a small area at the head of Raccoon creek and on Brushy fork of Lick and near the head. It is a thin bed here less than 30 inches at best and is generally split by a parting. It is opened at the head of Raccoon creek, where it shows 30 inches of coal with a 5-inch parting, this being the best exposure on this bed in this region. On the left of Raccoon creek it shows in the bed of the stream with 22 inches of coal and 7 inches of parting.

A bed less than 8 inches thick occurs cross-bedded between massive sandstones on main Lick creek at the Lick creek end of the Lick Creek-Licking River trail which passes through Elk creek. This coal has just the right interval to the Whitesburg coal to correspond with the Lacey Creek coal.

HOWARD COAL

The Howard coal is the lowest coal found above drainage on Lick creek, the next lower coal—the Wheelersburg coal of the Mine Fork region, being everywhere below drainage on this creek.

The only exposures of the Howard coal are at and near the head of Raccoon creek of Lick creek, where it is brought up by the rising dip. It is above drainage, dipping with the fall of the stream, from the forks of Raccoon creek near the head to about one-fourth mile above the mouth of Brushy branch of Raccoon creek, at which point the dip carries it below drainage. This coal bed is 10 to 11 inches thick and is overlain by over 10 feet of soft gray shales with calcareous concretions and is too thin to be of any practical value in the Lick creek region.

STRUCTURE OF THE LICK CREEK REGION

Lick creek is on the south flank of the Caney anticline. The strata dip down Raccoon creek rapidly—strata at the head of this creek being 160 feet higher than corresponding strata at the mouth. There is a general southwestern dip of 40 feet to the mile over this area, interrupted, however, by many local irregularities. No conspicuous faults have been noted in the Lick Creek area, though a fine example of a thrust fault on a very small scale occurs near the head.

The Fire Clay bed reaches a maximum elevation at the head of Raccoon creek of slightly over 1,100 feet and a minimum elevation of 933 feet. Just below the mouth of Raccoon creek giving a fall of 167 feet. Raccoon creek does not, however, flow at right angles to the strike as might appear from these elevations, as there is a curve in the strike, the strike direction changing from nearly N. W.—S. E. at the head to more nearly west and east at the mouth of Raccoon creek.

Detailed Discussion of the Coal of Lick Creek.

NIGGER BRANCH

Elevation of mouth, 796.

The first large left branch on Lick creek is called Nigger branch. It enters Lick creek below Bloomington.

Two hundred yards up Nigger branch coal has been raised from the stream bed, with the following bed section:

Tom Cooper Coal

	Feet	Inches
Hard, black shale with plant imprints		18
Block coal		12
Elevation	798	

The Gun Creek coal shows in natural exposure one-fourth mile up Nigger branch on the right of the trail. Bed section here is:

Gun Creek Coal

	Feet	Inches
Gray, sandy, thin-bedded shale	3	
Splint coal		6½
Flint fire clay		⅛—¼
Floor—bituminous shale		
Elevation	845	

A notable thing about this exposure and the following one of the same bed is the occurrence of a thin layer of flint fire clay at the extreme bottom of the bed. This is in no respect different from the characteristic flint fire clay of the Fire Clay bed. Its occurrence in the Gun Creek Coal bed is only local. This fact and the thinness of the seam here will prevent confusion of this bed with the Fire Clay bed.

Seventy-five yards up the branch, on the same side, this bed gives the following bed section:

Gun Creek Coal

	Feet	Inches
Massive sandstone	4	
Gray shale		1½
Splint coal		9½
Flint fire clay		⅛
Floor—gray shale		
Elevation	846	

At this point on the branch benches occur at 1110′± and at 1050 feet elevation. The bench at 1050 is a prominent bench and this elevation is of the lower break of this bench. This bench is the prominent bench whose lower break is 50 to 60 feet above the Whitesburg coal. This bench is very noticeable at the head of Mine fork and State Road fork. On some of the hills here coal beds with elevation as great as 1150 will have fairly good area. Coals up to 35 feet below the Hazard coal, therefore, may be found with fair area.

The Whitesburg coal shows in natural exposure one-half mile up this branch on the right. Bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	4	
Splint and block coal mixed		6
Floor—bituminous shale		2
Elevation	902	

One-fourth of a mile from the head of this branch, on the left by a house, the Fire Clay coal gives the following bed section under a rock ledge:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	4	
Gray fissile shale		1½
Soft block coal		1
Gray, sandy shale		5½
Soft block coal		3
Gray shale		3½
Splint coal		6
Soft, gray clay shale		20+
Elevation	952	

MAIN LICK CREEK.

The Fire Clay coal was opened in a 25-foot wet entry, on the first right branch above Bloomington, 150 yards on the right, by Jim R. Nichols. Bed section here is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	3	
Light-gray clay shale		15
Block coal		5
Light-gray shale		7
Hard, bituminous black shale		2
Splint coal		17½+?
Elevation	933	

It is not certain that the base of the coal was reached, but the bed is probably not more than a few inches thicker, if any.

On the next right branch, one-fourth mile up the branch in the bed of the stream, Mr. Isaacs has raised coal from the Gun Creek bed at elevation 850. The openings were caved and the coal was not measurable. This coal was reported to be 15 inches thick. Two hundred yards below this point, in the bed of the stream, fissile, black shale and calcareous concretions show at elevation 820.

Mr. Isaacs has a prospect into the Fire Clay coal in a small right drain directly opposite the mouth of Raccoon creek with a bed section as follows:

Fire Clay Coal

	Feet	*Inches*
Light-gray, thick-bedded clay shale	7	
Dark, bituminous shale		6
Soft block coal		8
Gray clay shale		18½
Splint coal		4
Flint fire clay and bone coal		4
Splint coal		16
Elevation	944	

RACCOON CREEK

Elevation of mouth, 800.

One and one-fourth miles up Raccoon creek is a large left branch known as Rocklick branch. Elevation of mouth, 815.

One-third mile up Rocklick branch, in the bed of the branch, coal has been raised from the Tom Cooper bed. The black, fissile shale of the roof shows here, but no coal in place was visible. The coal was reported 15 inches thick.

Tom Cooper Coal

	Feet	*Inches*
Black shale roof		8+
Coal, reported		15
Elevation	834	

At the head of Rocklick branch, on the left, E. Murray has a 20-foot wet entry into the Young coal. Bed section here is:

Young Coal

	Feet	Inches
Light-gray, thick-bedded clay shale	6	
Thick-bedded, blue-gray slate	3	
Coal and dark-gray shale mixed		14
Light-gray clay shale		18
Block coal		16+
In water and mud		14
Elevation	1135	

The coal was reported 30 inches thick, and assuming the interval concealed under water to be coal this would be the actual thickness in this opening.

A section on the hillside at this point is:

Section

		Feet
Residual debris of High Rock sandstone on the top of the hill	Elevation	1275
Covered interval		40
Bench		
Covered interval		50
Lower break of prominent bench		
Covered interval		5
Coal bloom (Whittaker coal) reported to be 3 feet thick	Elevation	1180
Covered interval		5
Bench		
Covered interval		35
Slight bench		
Covered interval		5
Young coal opening (bed section given above)	Elevation	1135
Covered interval		10
Bench		
Covered interval		20
Massive sandstone		20
Covered interval		10
Haddix coal bloom and bench	Elevation	1075
Covered interval		15
Coal bloom, black shale roof—low split of Haddix	Ele.	1055
Covered interval		40
Coal bloom with black shale roof 3 feet ± thick—Fire Clay Rider	Elevation	1005
Massive sandstone		15
Place of Fire Clay coal	Elevation	990

One mile up Raccoon creek above the mouth of Rocklick branch is a large left branch known as Improvement branch. Elevation of mouth, 840.

A section on Improvement branch from the mouth to the head corrected for the downstream dip of 20 to 25 feet is as follows:

Section

	Feet
Covered interval, probably shaly sandstone	8
Whitesburg coal—coal reported 12 inches thick, with a black shale roof 1½ feet thick........Elevation	998
Covered interval	16½
Massive sandstone	25
Soft, gray fissile shale	10
Massive sandstone	30
Thin, hard, gray, sandy shale	8
Soft, blue-gray, thick-bedded shale with calcareous concretions	5
Fine-grained, fissile shale	4½
Soft, gray, fissile shales with concretions	5
Massive, soft gray sandstone	1
11-inch coal—Tom Cooper........Elevation	892
Medium gray, soft shales	13
Massive sandstone	11
Light-gray sandy shale	12
Top of fine-grained, massive sandstone, 5 feet thick, elevation of top	858

There are no coal beds opened on Improvement branch, but coal has been raised from the Whitesburg bed 200 yards up a left branch at the head of Improvement branch.

On a right branch of Raccoon creek, opposite the mouth of Improvement branch, the following section was obtained in a road leading to Buffalo creek of Lick creek:

Section

		Feet
Top of small; rounded knob		
Covered interval		58
Thin-bedded sandstone and sandy shales		20
Young coal bloom	Elevation	1145
Covered interval		15
Coal bloom and bench—low split of Young coal	Ele.	1130
Massive sandstone		20
Covered interval		5
Bench		
Light-gray sandy shale		15
Massive sandstone		8
Shaly sandstone		9
Fine-grained, massive sandstone		3
Thin-bedded, sandy shale		5
Covered interval		5
Hamlin coal bloom	Elevation	1060
Light-gray clay shale		7
Massive sandstone		31
Covered interval		2
Fire Clay Rider, 20± inches thick	Elevation	1020
Thin bed of massive sandstone		5
Covered interval		12
Bench and flint fire-clay float—place of Fire Clay coal	Elevation	1002
Covered interval		10
Massive sandstone		17
Covered interval		10
Whitesburg coal bloom and bench	Elevation	965
Covered interval		5
Massive sandstone		30
Covered interval		10
Gun Creek coal bloom with black shale roof	Elevation	920
Covered interval		10
Massive sandstone		6
Elevation of base of section		904

The following section has been made on this road from its top on the Buffalo creek side of the divide, between Buffalo creek and Raccoon creek, to the base on a large left branch of Buffalo creek:

Section

		Feet
Hamlin coal bloom and bench	Elevation	1110
Interval, largely massive sandstone		49
Thin coal bloom—high split of Fire Clay coal	Elevation	1061
Covered interval		8
Fire Clay coal bloom	Elevation	1053
Covered interval		19
Massive, fine-grained sandstone		13
Covered interval		11
Whitesburg coal bloom	Elevation	1010
Massive sandstone		29
Light-gray, thin-bedded shaly sandstone and hard sandy shale		11
Gun Creek coal bloom	Elevation	970
Massive sandstone		15
Gray shale and dark gray to black soft shale		15
Covered interval		5
Fine-grained, light-gray massive sandstone		10
Tom Cooper coal bloom	Elevation	925
Light-gray shaly sandstone		10
Massive sandstone		5
Elevation of base of section on massive sandstone		910

It will be noted from these sections that there is a conspicuous rise of strata in a southerly direction, the Fire Clay Coal horizon being 50 feet higher on the Buffalo creek side of the divide than on the Raccoon side. Raccoon creek apparently runs in the trough of a syncline for a short distance near the mouth of Improvement branch.

The next large, left branch of Raccoon creek, whose mouth is a little less than a mile above the mouth of Improvement branch, is known as Brushy fork.

One-third mile up Brushy fork and 200 yards up a small left branch (not shown on the map) George Helton has raised coal from the Lacey Creek bed. The opening is now caved, but the coal was reported to be 5 inches thick. Immediately over the coal is gray shale. Eight to 10 feet over the bed is a massive sandstone ledge 12+ feet thick. Elevation of the Lacey Creek coal here is 935.

One of the split beds which in this region represent the Fire Clay coal has been opened by George Helton 150 yards above this point, on the left of the same branch. The opening is now completely caved.

Fire Clay Coal

	Feet
Roof—shaly sandstone, bituminous in the lower portion	
Coal—reported 3 feet thick with 1-inch shale parting	
Elevation	1085

Eight feet of massive sandstone roof and over this massive sandstone a 2-foot bloom of coal was reported here. This opening occurs well up on a bench.

Below this bed, at elevation 1035, white clay shows, which is probably below a coal bed. This bed would be the Whitesburg coal.

Three-fourths mile up Brushy coal has been raised from the stream bed at elevation 942. This is the Lacey Creek coal.

Four-fifths mile below the head of the left one of the forks, at the head of Brushy fork in the main branch, coal is raised from the bed of the branch. This is a bed coming 10 to 15 feet below the Tom Cooper bed. The bed section here is:

Low Split of Tom Cooper Bed

	Feet	Inches
Blue-gray shale	1	
Soft, dark-gray to black clay shale	1	
Block coal		11
Hard, sandy bituminous shale		
Elevation	967	

One-eighth of a mile above this point and two-thirds mile below the head of Brushy, coal has been raised from the bed of the stream. This bed has a black shale roof and is the Tom Cooper coal, at elevation 983.

One-fourth mile below the head of Brushy, at stream level on the right, Johnny Blanton has a prospect into the Whitesburg coal. Bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone with coal streaks and plant remains at base		
Black shale	1½	
Soft, block coal		3
Block coal with considerable hard, dull coal		7
Light-gray, soft, clay-shale floor		13
Elevation	1050	

Two hundred and fifty yards up, on the right, Bill Montgomery has a prospect into a coal bed directly opposite his house. This is into a coal which is probably a lower one of the split Fire Clay beds. The bed section is:

Fire Clay Coal Split

	Feet	Inches
Thick-bedded, light-gray clay shale.............	4	
Hard block coal with considerable hard, dull coal		14
Light-gray, slaty shale floor		
Elevation	1080	

A little over one-half mile up Raccoon creek, above the mouth of Brushy fork and 150 yards up a small left branch, Wilbur Risner has raised coal from the Howard bed. The bed section here is:

Howard Coal

	Feet	Inches
Soft, gray clay shales........................	2	
Block coal		11
Elevation	923	

No coal bed having an elevation of more than 1140 will have any considerable area on the hills in this vicinity.

One-half a mile up Raccoon creek the Howard coal shows at stream level, at the forks of the creek, in natural exposure:

Howard Coal

	Feet	Inches
Soft, gray shale with calcareous concretions		
Block coal		10+
Elevation	950	

At the forks of the second right branch of the right fork of Raccoon creek W. A. Roarke has a 15-foot entry, completely caved and wet, into the Tom Cooper coal. The roof alone shows as follows:

Tom Cooper Coal

	Feet	Inches
Light-gray, clay shales........................	5	
Black shale near a slate......................		18
Coal, reported		30
Elevation	1028	

Coal has been raised from a thin bed, reported 12 inches thick, 80 yards up on a small right branch. Elevation, 965. Below this latter coal bed is a white, massive sandstone 15 feet thick with a fine-grained, uniform texture.

The Lacey Creek coal is opened, in a 25-yard entry, by Johnny Adams 150 yards above the mouth of this branch, on the left. The bed section here is:

Lacey Creek Coal

	Feet	*Inches*
Thick-bedded, light-gray sandy shale	5	
Block coal		5½
Gray shale		6
Block coal		21½
Light-gray, clay-shale floor		
Elevation	988	

W. H. Roarke has a completely caved opening into the same bed 50 yards above this opening, on the right. The coal was reported to be somewhat thicker in this caved opening than in the above-mentioned opening.

The Lacey Creek coal is exposed in the stream bed, one-fourth mile up the left fork of Raccoon creek, which is locally known as Trace fork. A partial section here is:

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	15	
Light-gray, sandy shale	4	
Massive sandstone	3	
Block coal		5
Light-gray, clay shale		7
Block coal		17 to 20
Elevation	997	

The Tom Cooper coal is opened, in a 15-yard entry, 70 yards up a small left branch of this fork of Raccoon creek. The mouth of the branch is at the exposure of the above-mentioned bed. Hiram Gillam's opening here gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Light-gray sandy shale	12	
Dark-gray to black shale	1	
Lustrous, soft, black coal		16—17½
Harder block coal with considerable hard, dull coal		10
Elevation	1022	

Twenty feet upstream on the right is an abandoned entry into the same bed. This opening gives the same bed section as the first.

The following section was made by A. R. Crandall and is given in Ky. G. S. Bull., No. 10—"Coals of the Licking Valley Region." The location as given in that report is at the Henry Howe place, one-half mile above the mouth of Raccoon creek on Lick creek. The nomenclature and elevations are by the writer, assuming the level of Lick creek at the base of the section as 810:

Section

			Feet
Iron ore kidneys in shale near the hill-top		Elevation	1180
Covered interval			20
Hazard coal bloom		Elevation	1160
Covered interval			65
Young coal bloom		Elevation	1095
Interval—the upper portion covered, massive sandstone in lower portion			35
Low split of Young coal under massive sandstone		Ele.	1060
Covered interval			85
Hamlin coal with black slate roof		Elevation	975
Covered interval			30
Fire Clay rider		Elevation	945
Covered interval			20
Fire Clay coal	Roof—shale Coal 2" Shale 8" Coal 9" Shale 5" Coal 10" Non-plastic fire clay 5" Coal 11"	Elevation	925
Covered interval			40
Thin coal bed—Whitesburg coal		Elevation	885
Covered interval			30
Bastard limestone concretions		Elevation	855
Covered interval			15
Thin coal bed—Gun Creek coal		Elevation	840
Level of Lick creek at base of section, approximately		Elevation	810

The coal at elevation 925 is certainly the Fire Clay coal. The Haddix, Trace Fork and Wet Branch coals are not given in this section.

Above the mouth of Raccoon creek and 1½ miles above Bloomington, Ben Howard has a prospect into the Fire Clay coal 150 yards up a small left branch, on a right drain. The bed section here is:

Fire Clay Coal

	Feet	*Inches*
Heavy, gray, clay shale	8	
Dark-gray shale	1	
Splint coal		12½
Dark, bituminous clay shale		6½
Block coal		9½
Flint fire clay		4½
Splint coal		8½
Floor—white clay shale		2
Elevation	957	

Above this bed there is a bench at elevation 990 and 17 feet below this opening a massive sandstone 40 feet thick shows.

The Fire Clay coal is opened in a 15-foot caved, wet entry by Proctor Owens 300 yards up the next left drain. The bed section here is:

Fire Clay Coal

	Feet	*Inches*
Light-gray clay shale	6	
Soft gray shale		6
Soft block coal		10
Sandy, dark-gray shale		12
Soft block coal		25
Elevation	953	

The lower 12 inches of coal are under water. It will be noted that no flint fire clay is shown in this section. It occurs in the 12 inches of coal which is beneath water and was therefore not found.

Two miles above Bloomington, in a right branch and at the downstream mouth of this branch and directly opposite the above-mentioned locality, Sam Keeton has a 25-foot entry into the Fire Clay coal. The bed section here is:

Fire Clay Coal

	Feet	*Inches*
Dark-gray, soft, sandy shale	2½	
Soft block coal		8½
Light-gray soft shale		2
Soft block coal		4½
Soft, light-gray clay shale		22½
Soft block coal		3
Soft, gray clay shale		6
Elevation	958	

This bed shows no flint fire clay, but the portion carrying the flint fire clay is thought to be below the floor. This bed is at the same elevation as the Fire Clay coal opening across the main creek. It also has the same position with respect to the benches. It may, however, be the Fire Clay Rider.

Two hundred yards up this right branch the Gun Creek coal shows in natural exposure in the stream bed:

Gun Creek Coal

	Feet	*Inches*
Gray shales	2	
Block coal		6½
Light-gray shale floor		
Elevation	857	

The next right branch of Lick creek heads towards Cripple creek of Licking river and a trail runs by way of these two branches from Lick creek to Licking river. The elevation of the mouth of this branch is 825. Fifty yards up this right branch, on the left bank, the Gun Creek coal shows in natural exposure. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	6	
Block coal		14
Floor—light-gray shale		
Elevation	840	

Sixty yards up this branch, in the bed of the stream, the Gun Creek coal was raised from an opening, now completely caved, at elevation 870. The immediate roof of this bed is black shale.

One hundred yards up the left fork of this branch, on the right of the first left drain, a completely caved opening made by Arthur Keith was into the Fire Clay coal at elevation 982. This bed was reported 20 inches thick with a hard parting. It occurs on a well defined bench.

Henry Lines has opened the Fire Clay coal bed in a small left branch directly opposite this branch and one-fourth mile up the branch in a right drain. The bed section is as follows:

Fire Clay Coal	*Feet*	*Inches*
Light-gray sandy shale	5	
Splint coal		20½
Flint fire clay		4—5½
Block and splint coal mixed		8
Light-gray clay shale		8
Splint coal		14½
Floor—dark-gray slaty shale		
Elevation	954	

Seventy-five yards up the branch coal has been raised from the Gun Creek bed. The bed section is as follows:

Gun Creek Coal	*Feet*	*Inches*
Soft, dark-gray shale		
Soft block coal		10
Elevation	852	

The Gun Creek coal is opened in a shallow prospect, on the right bank, one-fourth mile below the mouth of Buffalo, by W. F. Bailey. The bed section is:

Gun Creek Coal	*Feet*	*Inches*
Massive sandstone	3	
Black shale		15
Splint coal		15½
Light-gray shale		4+
Elevation	858	

William Adams has a prospect into the same bed 70 yards up the first left branch below the mouth of Buffalo, on the right:

Gun Creek Coal	*Feet*	*Inches*
Massive sandstone	4	
Black shale		5
Splint coal		18½+
Elevation	852	

One-eighth mile below the mouth of Buffalo creek, 150 feet up a small right branch, on the left, William Adams has a 3-foot prospect into the Gun Creek coal:

Gun Creek Coal	*Feet*	*Inches*
Massive sandstone	3	
Hard, black slate with coal and plant imprints		7
Laminated splint coal		14½
Soft, black bituminous shale		1½
Elevation	855	

BUFFALO CREEK OF LICK CREEK

Elevation of mouth, 835.

One and one-half miles up Buffalo creek, on the left, is a large branch. In the first right-hand branch above this left-hand branch, at the head of this branch, David Hickman has a prospect into a bed at the Fire Clay coal horizon. Bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	15	
Light-gray sandy shale		30
Block coal		6
Gray shale		2
Light, fine-grained sandstone		6
Coal		12
Coal and shale mixed		12
Light-gray shale floor		
Elevation	1075	

A section here is as follows:

Section

			Feet
Fire Clay coal opening (bed section given above)		Ele.	1075
Covered interval			45
Whitesburg coal bloom		Elevation	1030
Covered interval			47
Gun Creek coal	Light-gray clay shale 24"+		
	Coal 12"+	Ele.	983
Covered interval			43
Tom Cooper coal with black shale roof		Elevation	940

The Tom Cooper coal was opened at elevation 929, two miles up Buffalo creek on the right, by David Hickman directly opposite his house. This opening is now caved.

Two hundred yards above this opening, at stream level, is a natural exposure at the horizon of the Lacey Creek coal.

Lacey Creek Coal

	Feet	*Inches*
Massive sandstone	5	
Shale		
Block coal		4
Elevation	884	

The Tom Cooper coal is again opened 75 feet above the last location and just above W. Phipp's house, 100 yards up a small left branch on the right. The bed section here is:

Tom Cooper Coal

	Feet	Inches
Light-gray sandy shale		7+
Black shale		11
Block coal		17¼
Light-gray shale floor		
Elevation	930	

Twelve feet below this coal a 12-inch bed of coal was reported, with light-gray, sandy shale roof.

The Tom Cooper coal is opened in a 15-foot entry by John Whitt further up this branch, on the right bank, one mile from the head of the branch. The bed section here is:

Tom Cooper Coal

	Feet	Inches
Light-gray clay shale	4	
Dense black shale		18
Soft block coal		26½
Elevation	925	

The same bed is opened on the right 50 yards above this opening, in a prospect by H. Blair, showing 28½ inches of coal. This prospect is not driven to solid roof.

The Tom Cooper coal is opened one-fourth mile up, on the right, 21″+ of coal showing at this point. The black shale immediate roof, found in the next opening below, has here been entirely replaced by thin-bedded, shaly sandstone.

There is another opening 70 yards above this one on the right bank of the stream, the roof alone of the Tom Cooper coal showing here, the opening being caved and wet.

Two hundred and fifty yards above the mouth of Buffalo creek, on Lick creek, on the land of William Adams and opposite his house, the following traverse was made:

Section

	Feet
Top of hill on a massive sandstone ledge, which caps the hill at this point.........................Elevation	1120
Covered interval	30
Bench	
Covered interval	80
Hamlin coal, reported 36 inches—prospect caved....Ele.	1010
Covered interval	105
Reported position of coal bed—Whitesburg coal....Ele.	905
Covered interval	38
Gun Creek coal { Massive sandstone..6' Splint coal..........7½" Light, sandy shale floor } Elevation	867

No coal with an elevation greater than 1090 will have any considerable area here.

A coal which probably represents the Lacey Creek coal occurs, cross-bedded between massive sandstones, at the Lick creek end of the Lick Creek-Salyersville trail which passes up Elk creek. It shows at the mouth of the right branch up which the trail goes:

Lacey Creek Coal

	Feet	Inches
Massive sandstone	6	
Block coal		4½—8
Massive sandstone	5	
Elevation	850	

In bottom land of Lick creek, at the mouth of this branch, an old oil well, sunk before the Civil War, was reported to have passed through an 11-foot bed of coal. such a thickness is impossible as is shown by the exposure of all the lower coals on Mine fork, where no one of them reaches a thickness of over 30 inches. If the depth is correctly reported it was the Wheelersburg coal which was passed through, and it is possible that the soft gray shales below the Wheelersburg coal became mixed with fragments from the coal bed and gave rise to this report.

One-third mile up this branch, where a left branch comes in, the Tom Cooper coal occurs in natural exposure in the bed of the stream. The bed section here is:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	7	
Splint and block coal		12½
Shale floor		
Elevation	886	

Strata dip here in a southerly direction at an angle of 5°. This angle may not represent the total dip since the strike could not be determined.

Below this exposure a massive sandstone, calcareous in the upper part, shows in the bed of the stream. The elevation of the stream here is 870.

Just above a thin bed of massive sandstone which overlies the Tom Cooper coal, soft, dark-gray to black shales carrying calcareous concretions show in the bed of the stream from elevation 893 to 897.

Two hundred yards from the head of this branch, below the point where the trail goes up the hill, the Gun Creek coal shows in the bed of the stream in natural exposure. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Light-gray clay shale	6	
Black shale	4	
Splint coal		6½
Gray, soft, clay shale—floor 2"+ .....Elevation	935	
Shaly sandstone	4	
Gray, clay shale grading to sandy shale	3	
Block coal		2
Light-gray shale		½
Coal		1
Gray, clay shale floor		1+

The following section was obtained in the road which passes over the divide at the head of this branch:

Section

	Feet
Hamlin coal bloom (split)..................Elevation	1070
Interval	10
Hamlin coal—10½ inches thick (split).........Elevation	1060
Massive sandstone	28
Shaly sandstone	9
Fire Clay coal bloom. Coal appears 2+ feet thick, shows flint fire-clay parting.....................Elevation	1023
Light-gray sandy shale..................................	2
Light-gray clay shale...................................	8
Coal bloom, 10 inches (low split of Fire Clay coal ....Elevation	1013
Light-gray sandy shale..................................	18
Whitesburg coal { Black shale ....14+" Block coal.............. 8½" Light-gray clay shale floor 6+" } Ele.	995

On the right of a small left hollow entering the branch, at the point where the road on which the preceding section was made takes the hill, Campbell May has a completely caved opening into the Fire Clay coal, at elevation 1024, from which considerable coal has been taken. The roof alone shows now. Fragments of flint fire clay show on the dump.

The Fire Clay coal is again opened 300 yards up the main branch above the mouth of this small left hollow. An opening just started here on the left of the stream shows the following bed section:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	1½	
Thin-bedded, light-gray, clay shale		55
Block coal		18 to 22
Flint fire clay		4
Block coal		4
Light-gray shale floor		
Elevation	1025	

This opening is 2 to 3 feet higher than the caved opening to be mentioned below.

Directly across from this opening Campbell May has a completely caved opening, at elevation 1022, into the Fire Clay coal. The roof alone shows:

Seventy-five yards below this opening is a right branch. One hundred and fifty yards up this branch, on the left, is a completely caved opening into the Fire Clay coal, which is owned by Campbell May. The elevation of the opening is 1015.

At the head of this branch the following section was made:

Section

		Feet
Top of hill on massive sandstone	Elevation	1334
Massive, High-Rock sandstone		20
Base of High-Rock sandstone and cannel coal float	Elevation	1314
Covered interval		43
Flag coal bloom	Elevation	1271
Covered interval		60
Bench		
Covered interval		40
Bench		
Covered interval		5
Young coal bloom	Elevation	1171
Covered interval		60
Bench		
Covered interval		50
Bench	Elevation	1061

BRUSHY FORK

One and one-half miles above the mouth of Buffalo creek. Elevation of mouth, 857.

One hundred yards up Brushy fork of Lick creek, on the right, Mr. Montgomery has a completely caved opening into the Tom Cooper bed at elevation 925. The roof only shows. The Tom Cooper coal was opened by Henry Lane one-fourth mile up a left branch which enters Brushy fork one-half mile up. The opening is on the left side of this branch and gives the following bed section:

Tom Cooper Coal

	Feet	Inches
Massive sandstone		10+
Light-gray, clay shale	3	
Black shale	3	
Block coal		13½
Elevation	921	

Below this opening, at elevation 912, is the top of the massive sandstone which usually is found below the Tom Cooper coal in this region.

The Fire Clay coal has been opened in several places, now completely caved, on a left branch two-fifths mile up Brushy fork. At the head of a right fork of this branch Wiley Gullett has a completely caved opening, at elevation 1084, into the Fire Clay coal. The roof only shows here. This opening is at the upper break of the highest prominent bench on the hills here.

Another opening into the same bed is on a right hollow (the second from the head) 300 yards up on the right. This opening (also completely caved) is by Wiley Gullett and has the same bench location as the preceding opening. Elevation, 1080. The coal in these places was reported 36 inches thick, but it is probably not so thick. By another report the bed was 24 inches thick. The hills on this branch will have a good area of this coal.

At the head of the next left drain 150 yards below this one there is a natural exposure of the Whitesburg coal in a cave:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone—coal streaks and plant imprints in the base	10	
Hard, gray slate		11
Splint coal		9½
Soft, gray shale	1	
Elevation	1046	

The Lacey Creek coal is exposed 1 mile from the head of Brushy fork, 150 yards up a small left branch, on the land of Tom Cooper. A prospect here, 3 feet over the stream, shows as follows:

Lacy Creek Coal

	Feet	*Inches*
Light-gray, sandy shale	5	
Block coal with considerable hard, dull coal		12½
Black, bituminous, sandy, shale floor		
Elevation	912	

One-half mile up this branch Tom Cooper has raised coal from a thin bed in the stream bottom, at elevation 952. The roof only shows. This is the Tom Cooper coal. The interval between the Tom Cooper coal and the Lacey Creek coal on this branch is entirely made up of massive sandstone. The Tom Cooper coal is again opened in four adjacent caved openings on a small right drain of Brushy fork, a little below the above-mentioned left branch. These openings, also, are on Tom Cooper's land.

The Whitesburg coal was opened in a 20-foot entry, at the head of this drain, by Tom Cooper. The bed section here is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	3	
Splint coal		8
Gray shale		3½
Block coal		11
Impure, bituminous, gray shale		2
Gray shale floor		
Elevation	1037	

An excellent opportunity is afforded here of getting the interval between the Whitesburg and the Tom Cooper coals, which is 97 feet.

In the next right branch above this location, at the head, Tom Cooper has a 30-yard entry into the Whitesburg coal. The bed section here is:

Whitesburg Coal

	Feet	*Inches*
Light-gray, sandy shale	2	
Black, slaty shale	3	
Block coal		10
Light-gray shale		1
Coal		19½
Gray shale floor		
Elevation	1054	

Just at the foot of the hill below this opening a coal bloom shows in the haul road, at elevation 967, over a massive sandstone, forming ledges. This is the bloom of the Tom Cooper coal.

The next right branch of Lick creek has a trail going up it which comes out a little over a mile above Salyersville. The elevation of the mouth of this branch is 864. Two hundred and fifty yards up this branch, on the left, Will Adams has a prospect 3 feet deep into the Tom Cooper coal. The bed section here is:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	4	
Black shale		12
Block coal		15
Elevation	914	

The Fire Clay coal is opened up a right branch of this branch opposite this prospect. Two hundred yards up this branch is a left fork, and at the head of this fork Will Adams has an opening into the Fire Clay coal with this bed section:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	15	
Soft, fine-grained, dark-gray shale		18
Splint coal		19
Impure, flint fire clay		6
Elevation	1050	

At the head of this branch the following section was obtained:

Section

			Feet
Bench			
Covered interval			30
Whittaker coal—opening completely caved		Elevation	1255
Covered interval			39
Young coal bloom		Elevation	1216
Thin-bedded sandstone and shaly sandstone			32
Covered interval			5
Massive sandstone			30
Bench			
Covered interval			6
Haddix coal bloom, apprx. sec.	Coal 8" Shale 9" Coal 11"	Elev.	1135
Covered interval			29
8-inch Hamlin coal bloom		Elevation	1106
Covered interval			24
Massive sandstone			20
Fire clay coal bloom	Coal 3 " Light shale 1¾" Flint fire clay 4 "	Elev.	1062
Massive sandstone			31
Light-colored, thin-bedded sandstone			13
Whitesburg coal bloom, 7 inches thick, with black shale roof 12 inches thick		Elevation	1017
Light-gray shale			4
Hard, light-gray, sandy shale—in the lower portion some light, blue-gray shales			47
Fissile black shale, 18-inches— place of Gun Creek coal.			
Hard, light-gray, sandy shale			45
Massive sandstone			7
Base of section at		Elevation	914

The Tom Cooper coal is opened, at elevation 915, by H. Cooper, 150 yards up a small left branch one-eighth mile above the Lick Creek-Salyersville trail mentioned above. The opening is completely caved.

A small thrust fault shows on the left bank of the stream one-fourth mile above the Lick Creek-Salyersville trail. A thin coal bed 1 to 2 inches thick, at elevation 872, representing the Lacey Creek coal, is here faulted. The fault plane is inclined south 85° west 19°. The horizontal displacement of the fault is 8½ feet; the vertical displacement is 26½ inches.

Judge Cooper, in a small left branch back of his house, one-third mile above this point, has dug coal from the Tom Cooper bed, 70 yards up the branch in the bed of the stream. A partial section here shows:

Tom Cooper Coal

	Feet	*Inches*
Black, slaty shale		12+
Block coal		11½+
Elevation	902	

In a small left drain one-fourth mile up this branch, at the head, Judge Cooper has an opening partially caved and wet into a coal bed with bed section as follows:

Hamlin Coal

	Feet	*Inches*
Massive sandstone	8	
Thick-bedded, light-gray, clay shale	4	
Block coal		18
Light-gray shale		2½
Block coal		7+
Concealed in mud and water		5
Elevation	1093	

This bed was reported 34 inches thick, so it is probable that the lower 5 inches are coal.

Fifteen feet below this opening is a 30-foot ledge of massive sandstone. This is the sandstone which lies over the Fire Clay coal bed.

The Gun Creek coal is opened by Judge Cooper 250 yards up a left branch, one-third mile above his house, in a left drain. The bed section is as follows:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	4	
Block coal		23
Bituminous shale		2
Light-gray shale		4+
Elevation	940	

The coal is again opened at the head of this branch:

Gun Creek Coal

	Feet	Inches
Massive sandstone	6	
Block coal		8
Light-gray shale		1
Block coal		10
Hard bone coal		1
Light-gray, clay shale		
Elevation	957	

Below this bed is 30 feet of massive sandstone.

Coal has been dug from the Tom Cooper bed at the mouth of the first right branch above Judge Cooper's branch and below the school house. The coal rises from elevation 888 at the mouth to elevation 903 one hundred and seventy yards up the branch. The coal is not exposed, but the characteristic black shale roof was seen.

One hundred yards up the branch and just below the school house, the Tom Cooper coal has been opened by Boone Cooper on the left bank of the stream. The bed section here is:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	4	
Light-gray, clay shale	8	
Black shale	3	
Block coal		3½
Block coal with considerable hard, dull coal		13
Gray, bituminous, sandy shale		
Elevation	913	

The coal bed dips into the bank with a dip of 10° N., 30° W. This dip is probably only local.

Eleven feet below this bed is a series of thin seams of coal, shown below the Tom Cooper coal, as follows:

	Feet	Inches
Tom Cooper coal ..... Elevation	913	
Largely massive sandstone	11	
Massive sandstone		18+
Blue-gray, soft shale		8
Block coal		3½
Soft, gray shale		8
Gray shale with calcareous concretions		28
Block coal		4

These thin beds represent the coal bed often found 10 to 15 feet below the Tom Cooper coal.

The Tom Cooper coal shows in natural exposure two-thirds mile up Lick creek on the left bank, 4 feet over the stream and 100 yards below a house which stands at the mouth of a left branch. The bed section here is:

Tom Cooper Coal

	Feet	Inches
Black shale		
Block coal		16
Light-gray shale		2
Elevation	920	

Seventy yards up the same bed shows in natural exposure. Block coal 20½ inches. Elevation, 927.

One hundred and twenty yards up the next left branch, on the right of the branch, the Whitesburg coal has been opened, at elevation 1033, by Boone Cooper. The opening is now caved. The coal was reported to vary in thickness from 18 to 34 inches.

The Tom Cooper bed shows just below this opening in the bed of the branch at elevation 940. There is a rapid upstream rise of the Tom Cooper bed.

One-third mile up Main Lick creek, on the left, is a branch, up which the upper Lick Creek-State Road trail passes. Two hundred yards up this right branch, on the right of a left drain, Harry Roarke has a 15-yard entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	1	
Light-gray, thick-bedded, clay shale	2	
Black bituminous shale	3	
Block coal		19¼
Medium to dark-gray shale		3+
Elevation	1030	

On the same branch, on the left side of a right drain directly opposite the above-mentioned left drain, Harry Roarke has an opening into the same coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone with coal streaks and plant imprints at base	3½+	
Black, bituminous shale	3½	
Block coal		9
Block coal, with much hard, dull coal		12
Medium-gray shale floor		
Elevation	1030	

An opening 15 feet deep directly adjoining this gives coal 20 inches.

On the same branch, in the next right drain below the last, 150 feet up the drain, Harry Roarke has two adjacent openings into the Whitesburg. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Black shale	2	
Block coal		7
Block coal, with much dull, hard coal		12½
Medium-gray shale floor		
Elevation	1030	

The Hamlin coal has been opened, at elevation 1106, directly across from the mouth of this branch on the left side of the stream, by Harry Roarke. The opening is now completely caved. A prominent sandstone ledge shows 15 to 20 feet below this opening. The coal of this bed was reported 20 inches thick.

A section was made at this point as follows:

Section

	Feet
Top of the hill and coal bloom—low split of Young coal .... Elevation	1215
Covered interval	65
Interval containing a massive sandstone which outcrops in ledges	44
Small bench and opening into the Hamlin coal Elevation	1106
Interval including a massive sandstone 15+ feet thick standing out in ledges	26
Prominent bench	
Covered interval	45
Bench and location of the Whitesburg coal .... Elevation	1035

Only one hill in this vicinity will have any considerable area of the Young coal. The Hazard and Flag coals will probably have no area in this part of Lick creek.

On Lick creek, 150 feet above the mouth of the right branch on which are the openings into the Whitesburg coal, the Gun Creek coal gives the following bed section in natural exposure on the right of the stream:

Gun Creek Coal

	Feet	Inches
Massive sandstone	3	
Block coal		4
Light-gray, clay shale		8
Block coal		2
Gray shale floor		
Elevation	988	

One-half mile up Lick creek, in a small right drain 220 yards below the head of Lick creek, at the point where the road to State Road fork takes the hill, there is a prospect by John Montgomery into an upper split of the Fire Clay coal. The bed section is:

Fire Clay Coal—Split

	Feet	Inches
Massive sandstone	4½	
Block coal		2
Light-gray shale		4
Block coal		15
Elevation	1110	

At the head of Lick creek, where the road takes the hill, John Montgomery has a wet, 20-yard opening into the Whitesburg coal. The bed section here is:

Whitesburg Coal

	Feet	Inches
Light-gray, clay shale	4½	
Black shale	3	
Block coal		23
Elevation	1055	

There is a great change in thickness of the Whitesburg coal from where it is opened on a left branch of State Road fork barely one-half mile from the above-mentioned opening. The opening on State Road fork by Smith Adams gives a thickness of 63 to 65 inches of solid coal for the Whitesburg coal—a thinning of from 63 to 65 inches to 23 inches in less than half a mile.

The following section was obtained at the head of Lick creek:

Section

	Feet	Inches
Coal bloom—low split of Young coal..Elevation	1235	
Interval containing 12 to 15 feet of shaly sandstone, massive in places	32	
Trace Fork coal bloom ....Elevation	1203	
Shaly sandstone	1	
Fine-grained, massive sandstone	2	
Thick-bedded, light-gray, clay shale	3	
Coal bloom ....Elevation	1197	
Covered interval	17	
Place of fossil limestone ....Elevation	1185	
Covered interval	5	
Black shale a few inches thick		
Covered interval	10	
Haddix coal bloom ....Elevation	1170	
Interval	25	
Hamlin coal bloom with black shale roof, apparently the bloom of a thin bed....Elevation	1145	
Light-gray, sandy shale	3	
Massive sandstone with frequently a thin shell of limonite at the base ⅛-inch to ¼-inch	30	
Fire clay coal bed, with impure, flinty fire clay parting—not characteristic ....Elevation	1112	
Light-gray, sandy shale	7	
Coal bloom—fire clay coal split ....Elevation	1105	
Massive sandstone	10	
Light-gray, clay shale	11	
Coal bloom—Fire clay coal split ......Elevation	1084	
Fine-grained, light-gray, massive sandstone	8	
Light-gray, clay shale	5	
Massive sandstone		15
Light-gray, thick-bedded, clay shale	12	
Black shale	3	
Whitesburg coal, 23 inches thick ......Elevation	1055	
Light-gray, sandy shale	3	
Massive sandstone	43	
Gun Creek coal ....Elevation	1009	

LICKING RIVER

FROM THE MOUTH OF LICK CREEK TO SALYERSVILLE

General Discussion.

The coals exposed above drainage in this territory range from a thin coal 20 feet over the Flag coal to the Tom Cooper coal. The most promising coal from a commercial standpoint is the Fire Clay coal. Locally the Haddix coal will prove more valuable, but the above statement will hold for this region as a whole. The Flag coal is persistently present in this region where the hills are high enough, and is generally of workable thickness, but the area of this coal will be small.

Of the Hazard, Whittaker, Young and Hamlin coals little is known. What is known of these beds points to them as being of no economic importance, though without further prospecting this cannot be stated definitely to be the case, as the Hazard and Young coals may be workable in portions of the area. The coals between the Fire Clay coal and the Tom Cooper coal will not, so far as is known, be of commercial importance.

FUGATE COAL

Although the horizon of the Fugate was exposed in the 130 feet of strata exposed above the Flag coal in the high knob opposite the mouth of Grape creek, no coal bloom was found in the continuous exposure for 110 feet over the Flag coal. The Fugate coal is therefore thought to be entirely lacking in this territory. There is a slight bench at the horizon of this coal which probably indicates a shaly stratum in the otherwise continuous massive cliff-forming sandstone.

FLAG COAL RIDER

A thin coal bed, 15½ inches thick with 6-inch shale parting, is exposed on the high knob opposite the mouth of Grape creek. This coal comes 20 feet over the Flag coal; the interval between the two coals is largely massive sandstone, but a much finer-grained, more resistant sandstone than the High Rock sandstone which overlies the Flag Coal Rider. The High Rock sandstone is here granular, poorly cemented, soft and crumbly on weathered surface and weathers with an irregular pitted and grooved surface. The sandstone between the Flag Coal Rider and the Flag coal is finer grained, much harder and on exposure presents a comparatively smooth surface.

FLAG COAL

The Flag-Fire Clay interval varies here from 275 to 290 feet. In thickness the Flag bed varies between 32 to 36 inches solid coal with a reported minimum of 24 inches. This coal is unparted in this area. Because of the height of this bed on the hills it has been opened in only 3 places, but the coal is thought to be persistent over this region. The roof of the bed is light-gray, shaly sandstone. No cannel coal is known to occur in the Flag bed in this area. The coal is a mixture of splint and block coal, the proportions of the two varying widely in different parts of the bed section. The bed may be identified by its Fire Clay interval and may probably usually be distinguished from the Hazard coal by its greater thickness, as the latter bed is not thought to be over 2 feet thick over the larger part of this region.

THE HAZARD COAL

The Hazard-Fire Clay interval varies in this region from 240 to 250 feet. The Hazard coal in its only exposure showed 18 inches thick. The coal of the bed was largely splint coal. The Hazard coal, so far as is known, will have neither the thickness nor the area to be of economic importance in this territory. It is above drainage throughout this area, being very high on the hills.

THE WHITTAKER COAL

This coal is found between the Hazard and the Young coals at the same horizon as a corresponding coal on Lick creek. It has been opened only once in this territory. This opening showed 16 inches of coal and gave an interval to the Fire Clay coal of 195 feet.

Nothing can be said of the persistence of this bed or the stratigraphic nature of the interval between it and the Hazard coal, no good opportunity being afforded to determine the character of the interval.

YOUNG COAL

The Young coal has not been opened in this territory, but the bloom of the bed showed on the high knob opposite the mouth of Grape creek. The interval between the Young and the Fire Clay coals is 140 feet or about the average interval where the Young coal was last seen. On Rocklick branch of Raccoon creek it was 28 inches thick. It will probably vary in thickness from 20 to 30 inches in this area.

TRACE FORK COAL

The bloom of this coal occurs at several points in this region. The bed has not been opened, but the bloom has been dug into on May branch. The bed is probably thin and unworkable, but is above drainage everywhere in the region. In this area the Trace Fork coal comes within 20 feet of the Fossil limestone wherever found.

FOSSIL LIMESTONE

The Fossil limestone has not been found in this area, and in one place at least is cut out by a massive sandstone which lies over the Haddix coal. It is probable that this is generally the case throughout the region.

HADDIX COAL

The Haddix coal is locally a valuable cannel coal, 36 inches thick and of high quality. It only holds this thickness of cannel, however, on Colvin branch, having on the next branch upstream, Cripple creek, a maximum thickness of only 17 inches of cannel coal. On the branch just below Colvin branch the Haddix coal has not been found.

A. R. Crandall, in Bull. No. 10, Ky. G. S., gives the bed section of the Haddix as follows:

"Colvin Branch cannel coal" (Haddix)	*Inches*
Sandstone	
Coal	2
Slate	1
Coal	3
Slate	4
Cannel coal	36
Clay	

The openings into the Haddix coal on Colvin branch were all caved at the time of visit, so nothing is known of the variations, if any, in thickness of the coal on this branch.

Opposite the mouth of Middle fork the Haddix coal showed 28½ inches of stone coal with 3½ inches of parting. The Haddix coal is of workable thickness locally on the right of Licking river and so may be locally found workable in the territory under discussion outside of Colvin branch. It is an exceptionally variable coal in this portion of the county. The interval between the Fire Clay and Haddix coals is high in this territory, being 77 feet on Cripple creek. The interval between the Haddix and the place of the Fossil limestone is probably about 10 feet and is massive sandstone over much, if not all, of this territory.

HAMLIN COAL

The Hamlin coal is generally not present in this region. At one place, near Long branch, a heavy bloom was found at the horizon of the Hamlin coal with an interval of 43 feet to the Fire Clay coal and between Elk creek and Salyersville the Hamlin coal has been prospected. Nothing is known of the thickness of the bed.

FIRE CLAY RIDER

The bloom of this bed has been found at a number of places in this region. At times, however, it is cut out by the massive sandstone which comes over the Fire Clay coal. The bed is thin and probably unworkable. At the only place where a measurement was obtained it was 8 inches thick. In a number of places it has a black shale roof. The interval to the Fire Clay coal is 18 to 24 feet and is largely made up of light-gray, sandy shale and shaly sandstone, with a few thin beds of massive sandstone.

FIRE CLAY COAL

The Fire Clay coal is, so far as is known, a persistent coal throughout this region. The thickness of the bed ranges from 18 to 34 inches, with an average of about 26 inches. This bed has its best thickness in that portion of the territory nearest Salyersville, where it commonly has a few inches of cannel coal at its base. The only parting in the Fire Clay coal in this region is the flint fire clay, which varies from 2 to 4 inches in thickness and is persistent. The Fire Clay coal will have very good area in this region.

LOCAL COAL

There is a coal which is locally present on Long branch which occurs 17 feet below the Fire Clay coal. It varies in thickness on this branch from 9½ to 18 inches. This is not generally found over the region and will not be of economic importance.

WHITESBURG COAL

The Whitesburg coal is very poor in this region. So far as is known, it never attains workable thickness, its maximum thickness being 12 inches. A number of thin coal beds occur scattered through the interval between the Fire Clay coal and the Gun Creek coal. Most, if not all, of these coals must be considered splits of the Whitesburg coal. That one of these beds which is the first coal with a black shale roof below the Fire Clay coal is taken as the horizon of the Whitesburg coal. The interval of this bed to the Fire Clay coal is 30 feet.

The Whitesburg coal has very good area in this region, but because of its thinness will not be of economic interest.

GUN CREEK COAL

The Gun Creek coal has a maximum thickness of 22 inches with 6 inches of shale parting and a minimum thickness of about 2 inches. The Gun Creek coal has a poor roof and is usually much parted.

The interval between the Gun Creek coal and the Fire Clay coal in this region is largely shale with commonly a number of thin beds (splits of the Whitesburg) coal scattered through the interval. The interval to the Fire Clay coal is 95 to 100 feet. The Gun Creek coal is below drainage over most of this territory except that portion immediately bordering the river.

TOM COOPER COAL

This coal is thin and nonworkable in this region. It has a maximum observed thickness of 15 inches and a minimum thickness of 10 inches. It is below drainage everywhere except about the mouth of Lick creek and in a small zone along Licking river between the mouth of Elk creek and Salyersville. Near the head of Elk creek the Tom Cooper coal is also brought above drainage over a small area by the Johnson Creek fault. In the region from Elk creek to Salyersville, where this coal is above drainage, the usual black shale roof is missing and the bed is immediately overlain by massive sandstone.

The interval to the Fire Clay coal is 130 to 140 feet.

Between the Gun Creek and the Tom Cooper coals the dark-gray, calcareous shales with discoidal, calcareous concretions are excellently developed and are especially prominent between Elk creek and Salyersville.

STRUCTURE

The Johnson Creek fault crosses the river between Cripple creek and Long branch and crosses Long branch one-third of the way up, May branch about midway, and Elk creek near the head, and, running about parallel to the large right branch of Elk creek, passes into the divide between Lick creek and State Road fork, where it apparently dies out.

The throw, where observed, is from 80 to 100 feet. The fault is a normal fault with downthrow on the south side. The break is a sharp one and the fault appears to run approximately parallel to the Caney fault. The fault appears to be on the north limb of a previous anticline.

This results in the apparent anomaly of a strong dip on the downthrow side of a normal fault. There is a very slight drag-dip within a hundred feet of the fault line. This fault dies out in a distance of 3 miles east from where it had a throw of 90 feet as, except for a disturbed zone with no fault of any considerable throw just below Falcon in the bed of State Road fork, there is no evidence of a fault beyond State Road fork. The structure to the east, as is shown by the elevations of the coal beds, precludes any fault of over 20 feet throw.

DETAILS OF COAL OPENINGS

The Fire Clay coal has been opened in a 25-foot entry by J. B. Millard, 2¼ miles above the mouth of Lick creek in a straight line, in a small left tributary, 60 yards up a small left drain. The bed section is as follows:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone (forming ledges)	6	
Draw slate	1½	
Soft, gray shale		7
Soft, bright, block coal		6½
Light-gray, soft shale		6
Splint coal		13
Flint fire clay, mixed with bone coal		4
Splint coal		11
Elevation	905	

The following section was made up the high knob one-fourth mile above this opening and opposite the mouth of Grape creek:

Section

	Feet
Top of hill on massive sandstone .... Elevation	1305
Massive sandstone	65
Slight bench	
Massive sandstone	34
Flag coal rider (15½ inches thick with 6-inch shale parting) .... Elevation	1196
Covered interval, shaly sandstone and sandy shale	7
Fine-grained, hard, massive sandstone	9
Covered interval	5
Flag coal—caved prospect (coal reported 2 feet thick) Elevation	1175
Covered interval	30
Prominent bench	
Covered interval	40
Prominent bench	
Interval with massive sandstone about 15 feet thick at base	63
Covered interval	6
Young coal bloom and prominent bench .... Elevation	1040
Fine-grained, massive sandstone	85
Bench	
Covered interval—largely sandy shale	35
Fire clay rider coal bloom with black shale roof Elevation	920
Covered interval	7
Massive sandstone	8
Covered interval	5
Fire clay coal bloom .... Elevation	900

Three-fifths of a mile above the last-mentioned small left tributary and just on the upstream side of the high knob is a small left branch which enters the river just where it makes a large bend. This left branch forks one-eighth mile up. One hundred and forty yards up the left fork, on the left, W. B. May has a 12-foot entry into the Fire Clay coal. The bed section is as follows:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Gray, soft shale and coal	1	
Soft, bright, block coal		7
Hard, black, bituminous shale		1¼
Soft, bright block coal		12
Flint fire clay		2
Block coal with hard, dull coal		6
Light-gray, soft shale floor		
Elevation	900	

Directly across from this opening, on the right side of the stream, is another opening into the Fire Clay coal, which is $4\frac{1}{2}$ feet lower than this one.

Charley Helton has a 20-foot entry into the Fire Clay coal on the right fork of this branch. This opening is on the right bank, 140 yards above the point where the road crosses this branch. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Shaly sandstone	4	
Thick-bedded, soft, light-gray clay shale	3	
Soft, gray shale		8
Splint coal		20½
Flint fire clay		3
Splint coal		8
Elevation	900	

A thin coal bed, which represents a low split of the Whitesburg coal, shows in natural exposure on the left side of this branch, 140 yards below the Fire Clay opening and at the point where the road crosses the stream. The bed section is:

Whitesburg Coal Split.

	Feet	*Inches*
Massive, ledge-forming sandstone	5	
Block coal with thin layers of splint coal		10
Light-gray, clay, shale floor		1½+
Elevation	857	

This bed varies much in thickness, showing a variation of from 8 to 12 inches in less than 100 feet.

The following section was obtained on the Licking road where it crosses the rock promontory which runs out into the large bend of the river at the mouth of Grape creek:

Section

	Feet
Top of section ... Elevation	1040
Massive sandstone (forming ledges on the hills)	28
Trace Fork bench and coal bloom ... Elevation	1012
Covered interval	55
Bench	
Covered interval	25
Fire Clay rider coal { Black shale 20" Block coal 8" } Elevation	932
Covered interval	22
Fire clay coal bloom ... Elevation	910
Covered interval	22
Covered interval (probably largely sandy shale)	
Whitesburg coal bed (section given on preceding page) Elevation	857

The following section was obtained on the upstream side of the same rocky promontory in the road bed:

Section

		Feet
Haddix coal bloom	Elevation	998
Covered interval		18
Massive, ledge-forming sandstone		15
Covered interval		37
Fire clay coal bloom with flint fire clay	Elevation	928
Covered interval		23
Thin coal with black shale roof	Elevation	905
Covered interval		5
Coal bloom—apparently about 6 inches thick	Elevation	900
Covered interval (largely sandy shale)		15
Split of Whitesburg coal	Shaly sandstone....2′ Block coal........9″ Light, clay shale...3″+	E. 885

One-sixth of a mile up the first left branch on Licking river, above the mouth of Johnson creek, a prospect shows into a low split of the Whitesburg coal. The bed section is as follows:

Whitesburg Coal

	Feet	Inches
Shaly sandstone (bituminous in the lower portion		6
Dark-gray to black, bituminous sandy shale		14
Hard, block coal		7½
Light-gray, clay shale floor		2+
Elevation	865	

The same bed shows one-half mile up this branch on the right. The bed section here is:

Whitesburg Coal

	Feet	Inches
Light-gray, hard, sandy shale	3½	
Dark-gray, shaly sandstone		4
Block coal		8½
Light-gray, soft, clay shale		2+
Elevation	886	

There is a considerable rise of strata up this branch. Rate of rise is about 85 feet to the mile.

One-quarter of a mile up the river, on the left bank, opposite the ford of the Johnson Creek road, what is probably an upper split of the Whitesburg coal has been opened by a digging now caved. The elevation of the prospect is 910. The coal bed occurs at the lower break of a small bench. No flint fire clay could be found in the dump.

COLVIN BRANCH

The following is a combined section on Colvin branch:

Section

	Feet
Whitesburg coal, with black shale roof, raised from the stream, digging completely caved ....Elevation	896
Interval	11
Light-gray, thin-bedded, fine-grained, shaly sandstone ..	1
Interval	6
Shaly sandstone with calcareous concretions	4
Soft, gray shales, carrying concretions	3
Interval	14
Gun Creek coal bloom { Light-gray, sandy shale Coal ....2"± } .Elev.	833

The Haddix coal has been extensively opened by a number of shallow entries on the right bank of Colvin branch. The caved openings extend for one-eighth mile. Abundant cannel coal fragments show on the dump. The roof of the bed shows as follows:

Roof of Haddix Coal

	Feet	Inches
Massive sandstone—coal streaks in the base	2	
Bright, splint coal		5
Gray, soft shale		12
Bright, splint coal		2½
Light-gray, thick-bedded, clay shale	1½	
Elevation	1000	

The bottom was not reached. The cannel coal lies below this exposure, but is nowhere exposed on this branch.

Directly opposite this point, on the left-hand side of the branch, diggings into the Haddix bed, also caved, show. The Haddix coal is reported to be 36 to 40 inches thick here and solid cannel of a very high grade. This coal is opened on the next branch above this one (Cripple creek), but is here much thinner, showing 18 to 20 inches of cannel coal.

The following section was obtained in a small left drain on Colvin branch:

Section

		Feet
Haddix coal opening	Elevation	1005
(Blocks of cannel coal 16 inches thick show on dump)		
Covered interval		39
Massive sandstone		10
Covered interval		41
Flint fire clay float	Elevation	915
Covered interval		20
Whitesburg coal bloom—high split: Light-gray, sandy shale ....2' Thin coal ....2"±	Elevation	895
Soft, gray shale with calcareous concretions		1
Calcareous, shaly sandstone with concretions		1
Covered interval		13
Coal (prob. Whitesburg): Shaly sandstone Gray shale ....1½' Splint coal ....10" Soft, gray shale floor 1"+	E.	880

CRIPPLE CREEK

The Fire Clay coal has been opened at elevation 924, in a small left drain back of the first left house, 200 yards up Cripple creek. The opening was on the left of this drain and 70 yards up. The roof alone shows. Flint fireclay fragments show on the dump.

The Fire Clay coal is opened by Lee Reed 100 yards up a left hollow one-fourth mile up Cripple creek, on the right. Three adjacent openings give the following bed section:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-gray shale	1	
Block coal		19
Flint fire clay		3
Block coal		7
Gray shale floor		
Elevation	918	

The Haddix coal has been opened in three places at the head of this left hollow. It gives the following bed section in a 35-foot entry by Lee Reed:

Haddix Coal

	Feet	Inches
Massive sandstone	3	
Block coal		4
Light-gray shale		3½
Block coal		2½
Gray shale	4	7½
Cannel coal		15½
Gray shale		
Elevation	995	

In an opening 80 feet to the left of this one the following section was obtained:

Haddix Coal

	Feet	Inches
Block coal		3
Gray, soft shale		10½
Cannel coal		15½
Gray shale floor		
Elevation	995	

The Haddix-Fire Clay interval is here 77 feet.

Directly over these Haddix openings Lee Reed has a 30-foot entry into a bed which is 195 feet above the Fire Clay coal and which comes about midway between the Young and Hazard coals. The bed section is:

Whittaker Coal

	Feet	Inches
Massive sandstone	12	
Block coal		16
Clay shale floor	1	
Elevation	1113	

The Haddix coal is again opened directly across from this left hollow, on the right side of Cripple creek. Charlie Hunt has a number of closely adjacent openings at this point, all caved and wet. The bed section is as follows:

Haddix Coal

	Feet	Inches
Massive sandstone	3	
Cannel coal		17
Gray shale		4+
Elevation	1018	

There is a noteworthy change of roof here from a soft, gray-clay shale with two thin beds of block coal, found over the bed across the branch, to a massive sandstone 3+ feet thick over the above opening.

The Hazard coal has been opened by Harmon Reed 200 yards up, on the right, near the top of the divide between this and the next tributary, with the following bed section:

Hazard Coal

	Feet	*Inches*
Light-gray, clay shale		
Black shale		5
Block coal		12
Light-gray, clay shale		¼
Block coal		6
Sandy shale floor		
Elevation	1160	

This bed occurs at the upper break of a prominent bench.

One-half mile up Cripple creek is a large left branch. Coal is raised from the Whitesburg coal from the bed of the stream 200 yards up this branch. Coal fragments and blocks of black shale from the roof show at elevation 860, but the coal was not visible.

One hundred and twenty-five yards up this fork, on the right bank 6 feet over the stream, there is a 25-foot entry into the Fire Clay coal by Porter Watson. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	2	
Light-gray shale	1	
Block coal		3½
Hard, gray flinty shale parting		1½
Block coal		19
Flint fire clay		3
Block coal		7
Elevation	895	

The Fire Clay coal has been opened, at elevation 923, by Scott Colvin in a small right drain one-third mile above this left fork. The opening is completely caved and the roof alone shows. Flint fire-clay float shows on the dump.

Two hundred and fifty yards up Cripple creek, in the stream bed, coal has been dug from a bed with black shale roof, at elevation 876. This is a low split of the Whitesburg coal.

A section above this bed, in the bed of the stream, is as follows:

Section

	Feet
Massive sandstone	4
Dark-gray, shales with calcareous concretions	5

The Fire Clay coal is again opened 120 yards up the first right branch on Cripple creek below the head. An opening on this branch on the right bank shows the following bed section:

Fire Clay Coal

	Feet	Inches
Massive sandstone	1	
Light-gray shale and thin coal		10
Block coal		4½
Light-gray, soft shale		1½
Block coal		18½
Soft shale floor		2½
Elevation	925	

One hundred and thirty yards up the main stream coal has been raised from a bed which is called locally the "Rock Vein," at elevation 925. This bed is undoubtedly the Fire Clay coal. The flint fire clay is often called "rock" in this region.

The Hazard coal has been opened by Milton Crace at the head of Cripple creek, on the left, at elevation 1170. The opening is completely caved. This coal was reported to be 28 to 36 inches thick with 2±″ of shale parting. About 40 feet above this opening massive sandstone cliffs stand out on the hilltops. These cliffs are the High Rock sandstone.

Coal blooms show below this opening at the following horizons:

Bench and coal bloom at elevation 1032. This coal is a coal coming 30 feet above the place of the Fossil limestone, between the limestone and the Young coal. It is probably the Trace Fork coal.

Coal bloom, elevation 960. This is the Fire Clay Rider.

About one-third of the way between the mouth of Cripple creek and the mouth of Long branch are two small tributaries on the left of the river. One hundred and fifty yards up the upstream one of these tributaries, on the right, Scott Howard has an entry into the Fire Clay coal bed. The bed section here is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	10	
Soft gray shale		9
Splint coal		7
Pyrite		1½
Block coal		12
Block coal with streaks of hard, dull coal		3½
Flint fire clay		3
Splint coal		5½
Elevation	920	

Just above the mouth of this branch the following coal blooms were found in the road:

		Feet	Inches
Low splits of the Whitesburg coal	Light-gray to brown, sandy shales	2	
	Coal ....Elev.	862	4
	Interval	5	
	Coal bed 1—13 inches thick under soft, gray shales. E.	857	

One-third of a mile above the mouth of the small left branch mentioned above and on the left side of a small left drain, at the point where the road to Long branch takes the hill as it passes over the divide between Long branch and the river, the Haddix coal is opened by John Reed and Wash Rice with the following bed section:

Haddix Coal

	Feet	Inches
Massive sandstone	3	
Soft, gray shale	1	
Splint coal		8½
Soft shale parting		3½
Splint coal		20
Very hard, gray sandy floor		
Elevation	993	

The following section was obtained on the road which passes over the ridge from this point to Long branch:

Section

	Feet
Point at which the road passes over the divide ...... Ele.	1060
Sandy shales	25
Bench	
Covered interval	2
White bottom, clay and faint coal bloom—Trace Fork coal ...... Elevation	1033
Sandy shale grading into shaly sandstone	25
Massive sandstone	58
Bench	
Covered interval	27
Coal bloom (?)	
Covered interval	38
Coal bloom overlain by 12 inches of black shale—low split of Whitesburg coal ...... Elevation	850

The following section was obtained on the Long branch side of the same road:

Section

	Feet
Bench	
Covered interval	32
Bottom clay ...... Elevation	1008
Shaly sandstone	20
Massive sandstone	25
Hamlin coal bloom ...... Elevation	963
Covered interval	23
Fire Clay rider coal bloom ...... Elevation	940
Light-gray, fine-grained massive sandstone	20
Fire Clay coal bloom ...... Elevation	920

LONG BRANCH

Two-fifths of a mile up Long branch is a small right branch. One hundred and fifty yards up this branch, on the left bank of the stream, the black shale roof of the Whitesburg coal is exposed at elevation 891. A section on the right side of this branch follows:

Section

	Feet
Top of hill on massive sandstone.............Elevation	1298
Covered interval—largely massive sandstone..........	78
Bench	
Covered interval	9
Caved coal opening and bench of Flag coal....Elevation	1211
Covered interval	14
Bench	
Covered interval	15
Bench	
Covered interval	55
Bench	
Covered interval	31
Bench	
Covered interval	20
Bench	
Covered interval	113
Bench	
Covered interval	51
Whitesburg coal bed with black shale roof.....Elevation	891

The opening into the Flag coal mentioned in the preceding section is located one-fourth mile up this right branch on the right-hand side. The opening, which is now completely caved, is on the land of J. J. Rice.

At the upstream mouth of this branch is a prospect into the Whitesburg coal, which gives the following bed section:

Whitesburg Coal

	Feet	Inches
Gray, clay shales............................	2	
Black shale		11+
Block coal		2
Elevation	869	

For 320 yards above the mouth of this left branch the strata dip strongly north to the Johnson Creek fault. The strike of this fault is S. 85° W. and the dip 20° to 25° S. At one place near the fault line the Fire Clay coal bed dipped 8 feet in 80 feet in a northerly direction.

Two hundred yards above the mouth of the first right branch on Long branch the following coals show on the right bank of the stream:

Section

		Feet	*Inches*
Fire Clay coal	Massive sandstone		
	Block coal		10
	Dark-gray shale		8
	Shale and coal mixed		10
	Block coal		16½
	Flint fire clay		6
	Block coal		9½
	Gray shale floor		
	Elevation	877	
Covered interval		17	
Coal	Massive sandstone		
	Block coal		10
	Bituminous sandstone floor		
Covered interval		21	
Whitesburg coal	Black fissile shale	1½	
	Block coal		8

One-half a mile up Long branch the Johnson Creek fault crosses the streams.

One hundred feet below the fault the Fire Clay coal lies for a distance of 50 to 100 feet at stream level. It is suddenly replaced by the black fissile shale of the Whitesburg bed, the latter bed being bent up at the fault line. On the north or down-throw side of the fault, a much fractured massive sandstone shows at stream level. This is a massive sandstone coming 35 to 40 feet below the Whitesburg coal. One hundred and fifty feet downstream the massive sandstone lying over the Fire Clay coal shows at the same elevation.

The fault plane itself is a clean break. There is no accessory faulting to any extent, but merely a disturbance of the strata resulting in the development of joints and minor local dips at various angles. The fault is a normal fault with a dip of the fault plane of 22° to 25° and strike S. 85° W. The downthrow is on the upstream or north side of the fault line and the throw is about 70 feet. On the upstream side of the fault line the strata soon cease to be disturbed and merely show a downstream dip at a low angle.

The Whitesburg coal is opened nine-tenths of a mile up Long branch. An opening on the left of the stream at stream level, by H. C. Rice, gives the following bed section:

Whitesburg Coal

	Feet	Inches
Fine-grained, shaly sandstone	4	
Black bituminous shale		18
Block coal		9
Soft, clay shale		2+
Elevation	926	

The coal is largely dug out of the stream bottom.

The Fire Clay coal is opened 120 yards up a small left branch which joins Long branch 100 feet above this opening. In an opening here by H. C. Rice the overburden has been stripped from the coal and 20 to 25 square feet of coal removed from the stream bed. A partial section here is:

Fire Clay Coal

	Feet	Inches
Soft, gray shale		3+
Block coal containing a little pyrite		22—24
Flint fire-clay floor		1+
Elevation	956	

This opening stopped at the flint fire-clay parting. Coal 10 inches thick is reported to have been found below the floor of this bed.

One hundred yards above this branch the Whitesburg coal has been dug from the bed of the stream at elevation 935. The opening is now caved.

One-quarter of a mile below the head of Long branch a coal bed between the Fire Clay coal and the Whitesburg coal shows at stream level. The bed section is:

Coal 17 Feet Below Fire Clay Coal

	Feet	Inches
Massive sandstone	3½	
Block coal		9½
Elevation	962	

One hundred yards further up in the bed of Long branch an 18-inch coal with 2 inches of black shale roof was reported in a 4-foot boring. The elevation of the bed is 972.

One hundred and twenty yards above the point at which the boring was made, in the bed of the stream, J. B.

Millard has raised coal from the same bed. The bed section is:

Coal 17 Feet Below Fire Clay Coal

	Feet	*Inches*
Soft, gray, shaly sandstone above	3	
Block coal		18
Elevation	987	

Sixty yards up the stream, on the left side, on the land of F. P. May, the Fire Clay coal has been opened. The bed section is as follows:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	3	
Gray clay shale with concretions	2½	
Bituminous clay shale ("draw slate")		11
Block coal		20½
Flint fire clay		4
Block coal		8
Gray shale floor		
Elevation	1007	

The following section was obtained on the road as it passes over a rocky promontory projecting out into a bend of the river. The base of the section is two-fifths mile above the mouth of Long branch and at the point where the Middle Fork road joins the Licking River road:

Section

				Feet
Coal bloom—split of Fire Clay coal (overlain by massive sandstone			Elevation	948
Shaly sandstone				4
Fire Clay coal bloom			Elevation	944
Massive sandstone				9
Covered interval				3
Coal	Thick-bedded sandy shale	2′	Elevation	930
	Coal	8″		
	Sandstone	4″+		
Fine-grained shaly sandstone				15
Base of section			Elevation	915

The following section was obtained on the left of the Licking River road at this point:

Section

		Feet
Bench and level hilltop	Elevation	1300
Covered interval		60
Flag coal opening	Elevation	1240
Covered interval, largely massive sandstone		30
Caved digging into reported coal bed. No coal bed seen	Elevation	1210
Covered interval		5
Bench		
Covered interval		85
Bench		
Covered interval		80
Upper break of long bench		
Covered interval		30
Lower break of long, gently sloping bench		
Covered interval		90
Small bench		
Covered interval		47
Base of section at elevation		878

The place of the Fire Clay coal in this section is at elevation 945. This gives a Flag-Fire Clay coal interval of 295 feet.

At this locality Abel May has two adjacent openings into the Flag coal 30 feet apart. The bed section is:

Flag Coal

	Feet	Inches
Massive sandstone	2	
Light-gray, heavy-bedded, clay shale	6	
Block coal		34
Soft clay shale floor		3+
Elevation	1240	

One hundred yards above this opening, on the same side of the road, Abel May has a wet, partially caved, 20-yard entry into the Flag coal. The bed section is as follows:

Flag Coal

	Feet	Inches
Light-gray, heavy-bedded, clay shale	7	
Block coal		32

MAY BRANCH

May branch is a small left branch of Licking river 1½ miles long, which enters Licking river one-half mile below Elk creek.

The bloom of the Gun Creek coal shows at the upper side of the mouth of May branch on the left of the Licking River road. A partial section is as follows:

Gun Creek Coal

	Feet	Inches
Block coal		10+
Elevation	855	

One-sixth mile up May branch, on the left, back of and 100 feet below his house, Jim May has a completely caved opening into the Fire Clay coal. The coal was reported to be 31 inches thick with a little slate on the top. Elevation of opening, 951.

FIRST LEFT BRANCH OF MAY BRANCH

Two hundred yards up the first left branch of May branch, on the right of the branch, strata show a dip of 12° N. 35° W. The bloom of the Whitesburg coal shows at elevation 885.

Two hundred and fifty yards up this branch, on the left, are two adjacent openings into the Fire Clay coal, one of them completely caved. The bed section is:

Fire Clay Coal

	Feet	Inches
Dark-gray shale with coal interlaminations	2	
Block coal		4
Light-gray, clay shale		1¼
Coal, including flint fire-clay parting		22½
Elevation	920	

The lower portion of this section was under water, but it was all coal with the exception of a flint fire-clay parting, probably less than 3 inches thick.

The following section was obtained on May branch, starting at the mouth of the first left branch. The intervals cannot be given on account of the strong and varying dips:

Section

Distance above mouth of first left branch	*Elevation—Feet*
260 feet—Base of massive sandstone	848
950 feet—Shaly sandstone, dip—15° N. 40° W.	857
1760 feet—Shaly blue-gray fine-grained sandstone	886
2020 feet—Thin coal bed with black shale roof raised from stream	887
2040 feet—Three feet of thin-bedded hard, shaly sandstone. Dip 40° N.	888
2200 feet--Coal raised from stream. Black shale roof 1+ foot. Over this is 2+ feet of thin, blue-gray shaly sandstone (a low split of the Whitesburg coal)	888
2340 feet—Soft, dark-gray shale carrying calcareous concretions. Strong N. dip	890
2410 feet—Coal 1 inch thick between dark-gray, soft shales. Dip 40° N. 10° E.	891
2840 feet—Coal with black shale roof raised from stream. Above the black shale is 2+ feet of massive sandstone. Coal reported to be 2 feet thick (Whitesburg coal)	904
3500 feet—Probable location of fault line	
3840 feet—Dark-gray shales with calcareous concretions	934
3850 feet—Coal bloom (Gun Creek coal)	937

One-quarter of a mile below the head of May branch is a small left branch. Two hundred yards up this branch, on the left, a completely caved opening into the Fire Clay coal by William Slusher shows only a portion of the roof at elevation 1023.

At this point the following section was obtained:

Section.

	Feet
Base of a small knob 40+ feet high which caps the hills here.	
Covered interval with thin ledges of massive sandstone in lower portion	70
Prominent bench	
Covered interval	5
Trace Fork coal bloom	Elevation 1114
Covered interval	46
Bench	
Covered interval, largely massive sandstone	45
Fire Clay coal—caved prospect	Elevation 1023

The Fire Clay coal is opened in a 15-foot entry by Lear Preston at the head of May branch, 200 feet up the left fork, on the right. Three adjacent shallow openings here have been made within a distance of 75 feet. The bed section here is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone, coal streaks and plant imprints in base	3	
Light-gray, clay shale	1	
Bituminous dark-gray shale and coal		6
Block coal		2
Bituminous shale		5
Block coal		15
Flint fire clay		2½
Block coal		9½
Clay shale floor		
Elevation	1015	

This is on the upthrow side of the fault.

One-fourth mile below the mouth of Elk creek, in a small left hollow. W. W. Bailey has a completely caved opening, 75 yards up this hollow, on the right.

This opening was reported to have faced a bed of coal 30 inches thick, solid coal. There is a massive sandstone ledge above the opening and one a short distance below. This is probably into the Fire Clay coal, although no flint fire-clay fragments were found in the dump. The elevation is 958.

Thirty-six feet below this caved opening a 10-inch bed of coal with black shale roof shows on the right-hand side of the hollow. This is the Whitesburg coal with bed section as follows:

Whitesburg Coal

	Feet	*Inches*
Black fissile shale		
Block coal		10
Elevation	922	

ELK CREEK

The Gun Creek coal has been opened on the right bank of Elk creek at the point where the Licking River road crosses the stream. An opening here by Henry May is completely caved. In a prospect 30 feet from this opening the following bed section was obtained:

Gun Creek Coal

	Feet	*Inches*
Light-gray shale with thin inter-beds of fine-grained sandstone	4	
Block coal		8½
Bituminous clay shale ("draw slate")		3
Block coal		3
Soft, gray clay shale		1½
Block coal		6½
Soft, clay shale floor		
Elevation	870	

The roof of this bed here is bad, the soft shale tending to cave.

The Fire Clay coal has been opened one-third mile up Elk creek, 100 yards up a small left tributary, on the left bank. An opening here by Henry May is very badly caved. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	8	
Light-gray clay shale	1	
Bituminous slaty shale	1	
Splint coal		2½
Light-gray shale		½
Block coal		17
Flint fire clay		3
Splint coal		12
Hard shale floor		
Elevation	983	

FIRST RIGHT BRANCH OF ELK CREEK

Sixty yards up this branch is a small right branch and 100 yards up this branch, on a right drain, Leet Caudill has a caved opening into the Fire Clay coal. Elevation of opening, 994.

At the head of this branch, on the right, Leet Caudill has dug into the Haddix coal. The coal bed appeared thin. Over the coal is a massive sandstone. The elevation of the bed is 1065.

One-third mile up the right branch of Elk creek, on the left, the Whitesburg coal has been prospected with bed section as follows:

Whitesburg Coal

	Feet	*Inches*
Light-gray clay shale	6	
Black shale		33
Block coal		12
Shale floor		4+
Elevation	912	

A section on this branch is as follows:

Section

	Feet
Lower break of a prominent bench	
Covered interval	40
Massive sandstone	10
Covered interval	68
Fire Clay coal bloom, showing fragments of flint fire clay .... Elevation	958
Covered interval	46
Whitesburg coal (section given above) .... Elevation	912
Covered interval	2
Dark-gray shales with large calcareous concretions and Septaria markings	10
Base of section on soft shales at elevation	900

The Fire Clay coal has been opened in a 30-foot entry by Doctor Conley in a left branch, three-fifths mile up Elk creek and 250 yards up the branch on the left. The bed section here is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	4	
Light-gray clay shale	1½	
Bituminous clay slate	1½	
Splint coal		10
Block coal		11½
Flint fire clay		2
Block coal		8
Clay shale floor		
Elevation	975	

Near the head of Elk creek is a large right branch—the first right branch of any considerable size on the creek. At the mouth of this branch the following section was obtained:

Section

	Feet
Lower break of a prominent bench. . . . . .Elevation	1025
Light-gray sandy shale	40
Massive, fine-grained, light-gray sandstone	24
Covered interval	6
Fire Clay coal blooms—shows flint fire-clay float. . . .Ele.	955
Hard, brownish, sandy shale	8
Thin coal bloom. . . . . .Elevation	947
Thin-bedded, shaly sandstone	21
Light-gray, thin-bedded, hard shaly sandstone	3
Whitesburg coal bloom—black shale roof. . . . . .Elevation	908
Covered interval	1
Light-gray clay shales	9
Thin-bedded, hard, light-gray sandy shales	8
Base of section. . . . . .Elevation	892

There is a strong northwest dip of 8° to 10° at the point where this section was taken. As the section was taken up a fairly steep hillside it is not thought that the intervals are much in error.

One-third of a mile up this branch, on the left, is a prospect into the Whitesburg coal by Frank May. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Shaly sandstone	3	
Black shale		22
Block coal		9½
Soft clay shale		
Elevation	906	

Two hundred yards above this point is a right branch. Two hundred yards up this branch, on the left, Harris May has a completely caved opening, at elevation 995, into the Fire Clay coal. The flint fire clay shows on the dump. The coal was reported to be 3 feet thick, with cannel coal at the base.

One hundred feet above the mouth of this right branch, on the left bank back of his house, Frank F. Fairchild has a completely caved opening into the Fire Clay coal, at elevation 993. A completely caved opening into the same bed at the same elevation shows on the opposite side of the stream, 60 yards up.

One hundred yards above this point, on the right, another completely caved opening by Frank May shows at elevation 973.

One hundred yards above this point the Fire Clay bed goes under drainage at elevation 948. This strong dip, at the rate of 360 feet to the mile up the branch, is due to the disturbance occasioned by the Johnson Creek fault, which runs nearly parallel to this branch and probably within a few hundred yards of it. The fault must cross the branch not far above the point where the Fire Clay bed was seen to go under drainage.

A coal bed has been opened, at elevation 1088, on the land of Frank May, 150 yards up a left branch at this point, on the left of the branch. The opening is completely caved. The coal was reported to be 3½ feet thick with 6 to 10 inches of "hard rock" parting in it.

Seventy-five feet below this bed a thin coal bloom shows. This is probably the Young coal, but correlation is uncertain on account of the rapid dip.

The Flag coal has been opened, in a 30-foot entry, by Mr. Cheek, 250 yards up the branch, on the right, under a high knob capped by the High Rock sandstone. The opening is badly caved. The bed section is as follows:

Flag Coal

	Feet	*Inches*
Massive sandstone	12	
Shaly sandstone	3	
Block coal		36
Elevation	1243	

The approximate base of the High Rock sandstone at this point is at elevation 1290.

On the right bank of Elk creek, 100 feet above the mouth of this right branch, the Whitesburg coal shows dipping below drainage. The dip of the bed is 8° N. 45° W. The bed section here is:

Whitesburg Coal

	Feet	*Inches*
Black shale		
Soft, bright, block coal		4½
Block coal with streaks of hard, dull coal		6
Elevation	868	

This abnormally high inclination of strata is due to the Johnson Creek fault which crosses the creek 70 yards north of this exposure.

The dip shows very clearly in the bench on the hillsides, which dip strongly in a northerly direction just before the fault line is reached. On the north or upthrow side of the fault the benches assume their normal, nearly horizontal position. There is a slight drag dip for about 30 feet on the downthrow, S. E. side of the fault. This drag dip is shown by the black shale roof of the Whitesburg coal, which is nearly horizontal for about 20 feet in the bed of the stream, just before the fault line is reached.

The actual break of the fault is exposed at the mouth of the left one of the three forks at the head of Elk creek above the large right branch where the fault is exposed in the bed of the stream. A knife-edge break shows here, finally slickensided. On the downthrow side dark-gray concretionary shales coming 30 to 40 feet below the Fire Clay coal are exposed. On the north of the small stream and on the upthrow side of the fault is a fine-grained, massive sandstone. Six to eight feet up, on the north bank, a coal bed is exposed which is 135 to 140 feet below the Fire Clay coal. This bed is the Tom Cooper coal. The fault line has a throw of 90 to 100 feet. The fault plane is steeply inclined, dipping about 65° S. The strike of the fault is S. 85° W., as it is on Long branch.

This is the most easterly point at which the actual fault was found, but the strong dips common to the downthrow side of the fault were shown strongly marked in the rapid dip of the Fire Clay coal into the stream two-thirds up the large right branch. The Fire Clay coal is 90 feet lower at the head of the left branch of State Road fork than it is at the head of the right branch of Lick creek. These branches are the ones on which the lower trail from State Road fork to Lick creek passes.

The fault line passes through the divide between Lick creek and State Road fork and is thought to curve in a more east-west direction as it passes to the east. One-quarter to one-half mile below Falcon there is a disturbed zone showing strong dips as high as 12°, but no fault was found. No displacement of strata has been found on State Road fork or further to the east. The Johnson Creek fault appears to die out, therefore, before it reaches State Road fork.

Two hundred yards up the right fork of these three forks coal has been raised from the stream bed at elevation 890. This is the Tom Cooper coal. The bed section here is:

Tom Cooper Coal

	Feet	Inches
Light-gray to white, fine-grained massive sandstone	1	
Splint coal		4
Soft charcoal		¼
Splint coal		11
Black, bituminous sandy shale		½+
Elevation	890	

This bed rises with the stream for 180 yards until at elevation 900, at which point it goes under drainage. The Tom Cooper coal has an apparent interval of 135 feet to the Fire Clay coal.

Two-thirds of a mile up this right branch, on the right, Hannon May has a prospect into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	7	
Gray, bituminous, clay shale	4½	
Block coal		15
Hard, bituminous shale near bone coal		4
Block coal with numerous streaks of hard, dull coal		10
Elevation	1035	

No flint fire clay was found in this section nor in the dump, but this bed is undoubtedly the Fire Clay coal.

Two hundred and twenty-five yards up the branch and 100 yards up a left branch a completely caved opening into the Fire Clay coal shows at elevation 1030. The roof only shows. Flint fire-clay float shows in the dump.

One hundred yards further up the branch, on the right, is a caved opening into the Fire Clay coal. The opening is by Hannon May. A partial section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-gray, thick-bedded clay shale	1½	
Block coal		19+
Elevation	1035	

The lower portion of the bed is in mud and water. The bottom of the bed is thought to have been reached, but the coal may be thicker than given above.

The Fire Clay coal grows thinner in a northeast direction. The coal was reported to be less than 20 inches thick in the caved openings above mentioned.

One-half a mile above the mouth of Elk creek on the left bank of Licking river, 7 feet above the river at the ford of the Licking River road, the Tom Cooper bed is exposed naturally as follows:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	6	
Splint coal		10
Elevation	840	

One-third mile above Elk creek on the left side of Licking river and 100 yards up the right fork of a small left branch a coal bloom at the horizon of the Hamlin coal has been prospected. The prospect is now completely caved. The section here is:

Section

	Feet
Massive sandstone ledge	15
Covered interval	10
Bench	
Covered interval	35
Hamlin coal bloom Elevation	1041
Covered interval	137
Massive, fine-grained, light-gray sandstone	49

In this section the place of the Fire Clay coal is at elevation 1000, and the place of the Gun Creek coal is over the massive sandstone member, at about an elevation of 906.

Two hundred and fifty yards above the mouth of this branch on the left is an opening into the Gun Creek coal on the land of George Reed. The bed section here is:

Gun Creek Coal

	Feet	*Inches*
Massive, fine-grained sandstone with plant impressions and coal streaks cross-bedded in the roof	4	
Block coal		7½
Dark-gray, soft, clay shale		1½
Brilliant block coal		4½
Soft, light-gray shale		6
Block coal		4
Medium soft, light-gray shale		1
Block coal		6
Elevation	908	

One-third to one-half mile below Salyersville, on the Licking River road, the following section was obtained:

Section

	Feet
Dark-gray, soft shales carrying small disc-shaped concretions	17
Covered interval	35
Gun Creek coal ... Elevation	910
Fine-grained, massive sandstone, shaly in places	31
Light-gray sandy shale	35
Covered interval	10
Bench	

The Gun Creek coal has been prospected on the left bank of the road one-fourth mile below Salyersville. The following bed section was obtained:

Gun Creek Coal

	Feet	Inches
Massive sandstone with plant imprints at base	3	
Block coal		15
Hard black slate		5
Block coal		7
Light-gray, soft clay shale with plant impressions	1	
Elevation	904	

FIRST LEFT BRANCH BELOW SALYERSVILLE

On the right of the first right branch on this branch A. T. Patrick has an opening into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Thin-bedded sandstone	3½	
Light-gray clay shale		33
Bituminous, dark-gray, slaty shale—"draw slate"		16
Block coal		20
Largely flint fire clay		3
Block coal		12½
Light-gray, slaty shale		
Elevation	1000	

One hundred yards up this branch, on the right, is a completely caved opening by A. T. Patrick. Considerable coal has been removed from this opening. Flint fire clay shows on the dump. The elevation of the opening is 967. This strong dip is due to the dip toward the Johnson Creek fault.

STATE ROAD FORK AND HEAD OF PAINT CREEK

There are three coals in this region which are known to have a thickness ranging from 30 to 65½ inches. These are the Haddix, the Fire Clay and the Whitesburg coals.

The opening showing the thickest coal bed in this territory is an opening into the Whitesburg coal by Smith Adams in a left branch one-third mile below Falcon. The bed here is 63 to 65½ inches of solid coal. The Whitesburg bed has never been found of so great thickness elsewhere in the county. In this place there seems to be an extreme local development of this bed in a pocket. On the same branch the same bed falls to a thickness of 30 inches and less. It is very improbable that this bed will be found in this place to have a thickness of over 30 inches for more than 75 acres and a thickness of over 50 inches is extremely improbable for a much less acreage.

The opening showing the next greatest thickness of coal is an opening into the Haddix coal by Henry Lemaster on Burton fork of Mash fork. The bed showed here 45½ inches of coal with 3 inches of shale parting and the bottom 7 to 8 inches of coal is cannel coal. An earlier measurement of the same bed by A. R. Crandall, of the Kentucky Geological Survey, gave 51 inches of coal with 4 inches of parting and 7 inches of cannel coal. There is small area of this coal bed in the vicinity of this opening, but it is thought that this bed will be of workable thickness in the territory adjoining this opening, though it will probably not be as thick as at this opening.

The opening showing the next greater thickness of coal is on Little Paint branch of Paint creek and just over the Magoffin county line in Johnson county. The Whitesburg coal, in an opening by Elisha Jackson, shows 45½ inches of coal with 11 inches of parting. This is thought to hold this thickness over an area of at least 300 acres and probably more, on the southeast side of Little Paint branch from this opening of Elisha Jackson's to its mouth. The Whitesburg coal where next opened to the north of Saylor's fork of Paint creek has a thickness of less than 30 inches. The next exposures of this bed to the west and south show also less than 30 inches of coal.

The opening showing coal of next greater thickness is into the Fire Clay coal of Town branch, Salyersville. In an opening here by Wayne Cooper this bed shows 45 to 46 inches of coal with 2½ inches of flint fire-clay parting. The Fire Clay coal on this branch varies from 31 to 46 inches in thickness, with an average of about 37 inches. It is not probable that the Fire Clay coal will hold this average thickness over an area of more than 400 acres. Except for a small area in Town branch and the immediately adjoining territory, in the extreme western part of the region under discussion, the Fire Clay coal is probably not of workable thickness. Elsewhere in this region the bed is badly split or even lacking, and frequently loses its characteristic flint fire-clay parting.

The strata found in this region have a stratigraphic range of from 40 feet below the Wheelersburg coal, at the mouth of Panther Lick branch of Paint creek, to 80 to 90 feet over the Flag coal in the High Rock sandstone. This latter exposure is on a high knob 1450+ feet high at the head of the left fork of Isaiah fork of Paint creek.

THE FLAG COAL

A coal bloom which must be the Flag coal was reported just under a massive sandstone ledge which caps the very high points at the head of the left fork of Mash fork on the land of Wib Perkins. The interval of this coal to the Fire Clay coal agrees very well with what the Flag-Fire Clay interval should be. Its position below a sandstone cliff also is good evidence for this coal's being the Flag coal.

THE HAZARD COAL

This coal bloom was not found in this region. A bed which is probably a high split of the Hazard coal was reported as a heavy bloom 15 feet below a massive sandstone on Little Paint creek. This bloom has an approximate interval to the Fossil limestone of 160 feet. This bed will have no area in this region.

THE WHITTAKER COAL

The bloom of this bed was found in the traverse made at Jackson's place on Little Paint fork of Paint creek. The interval of this coal to the Young coal is 50 feet.

Nothing definite is known of its thickness, but it is not thought to be of workable thickness. Because of its lack of area it will not be a coal of commercial importance even if of workable thickness.

A coal bloom was found between the Young and the Whittaker coals on Elisha Jackson's land on Little Paint fork of Paint creek. This is probably a split of the Young coal as no coal is known elsewhere between the Young and Whittaker coals. The interval of this coal to the Young coal is 25 feet.

In much of this region, especially on State Road fork of Paint creek and on Panther Lick branch, a massive sandstone comes over the Young coal. This sandstone forms pronounced cliffs where the formation is well up on the hills, which are quite a conspicuous feature in the landscape. The cliffs resemble the Flag cliffs very closely, from a distance. The rock differs in its mode of weathering and in being finer-grained and better cemented. This massive sandstone formation is 30 to 40 feet thick.

THE YOUNG COAL

The Young coal has very little area in this region. It will only be found with any area where the hills rise to 1,350 to 1,400 feet or over.

Nothing is known of its thickness here. Where it was last seen, at the head of Rocklick fork of Rockhouse fork, it was over 40 inches thick with some parting. On account of its exceedingly small area the Young coal will probably be of no economic interest. Its interval to the limestone is 60 to 70 feet.

COAL BETWEEN THE TRACE FORK AND THE YOUNG COALS

A heavy coal bloom is found near the top of the divide between State Road fork of Licking river and Mine fork and Lick creek. This coal bloom is 50 feet over the place of the Fossil limestone. At the head of Mash fork a coal bloom was found at about this horizon—30 feet below the Young coal. This coal has nowhere been found exposed, so its thickness cannot be given. It is possible that this bed is a low split of the Young coal.

TRACE FORK COAL

Two thin blooms show just over the place of the fossiliferous limestone and within 25 feet of it on the road leading from State Road fork of Licking river to Mine fork and Lick creek. They will be of no economic importance, but are of interest as coming in this region at the horizon of a coal which occurs further up Licking river just over the limestone, and is called the Trace Fork coal. These coal blooms are not persistent.

FOSSIL LIMESTONE

The Fossil limestone has not been found in this region. This is possibly due in a large measure to the height of this bed in the hills. It would occur at elevation between 1140 and 1260. It is believed, however, that the Fossil limestone is totally lacking over much of the territory as it has been shown to be absent in a number of sections.

THE HADDIX COAL

The bloom of the Haddix coal is found persistent through this area. In the only place where the Haddix coal was seen, at Henry Lemaster's opening on Mash fork, the bed was of good thickness (45+″ with 7 to 8 inches of cannel coal at the bottom). This coal has rather poor area on most of the hills of this region. It should be worth investigating, however, especially on Mash fork and at the head of State Road fork. On the road from State Road fork of Licking river to Lick creek the bloom of the Haddix coal was seen, but the bed appeared to be thin. Evidence as to the thickness of a bed from its bloom, however, is uncertain at best. A coal at the Haddix horizon at Elisha Jackson's place on Little Paint fork of Paint creek was reported to be 2 feet thick. The interval between the Haddix and Fire Clay coal is 65 to 75 feet.

FIRE CLAY RIDER

A coal which is either the Fire Clay Rider or the Hamlin coal, but probably the former, is opened at the head of the left fork of Mash fork and near the head of the left fork of Isaiah fork.

This bed here varies from 18 to 35 inches in thickness. It has not been seen elsewhere in this region and its horizon is usually occupied by the massive sandstone overlying the Fire Clay coal. This coal will probably have no economic importance except possibly locally in a restricted area at the location mentioned above. The interval to the Fire Clay coal is 25 to 30 feet.

THE FIRE CLAY COAL

This coal is everywhere above drainage, but throughout much of the region it is high on the hills and has small area. It reaches a maximum thickness in Town branch, Salyersville, of 45 to 46 inches, with 2½ to 3 inches flint fire-clay parting, and here has good area. It has a minimum thickness of 3 to 6 inches when split up into thin beds. Where the Fire Clay coal is split up the flint fire-clay parting is either poorly developed and lacking its peculiar characteristics or is entirely absent. There is a possibility that the Fire Clay coal may be found of workable thickness in the lower portions of State Road and Mash forks, but the only direct evidence in favor of such an assumption is the proximity of these districts to Town branch and Burning fork, where the Fire Clay coal is of workable thickness.

THE WHITESBURG COAL

This coal has the largest area of any of the workable coals. It is everywhere above drainage in this region, and except in portions of State Road fork of Paint creek and Panther Lick branch of Paint creek is never so high in the hills as not to have good area.

The Whitesburg coal varies in thickness from a minimum thickness in a series of thin, split beds in Town branch and 18 inches on State Road fork, about 1 mile above the mouth of Mash fork, to a maximum thickness of 65½ inches on State Road fork near Falcon, and 45½ inches with 11 inch parting just over the county line in Johnson county on Little Paint fork of Paint creek. These two maximum thicknesses mentioned are very exceptional and have little area, especially the former. The average thickness of the Whitesburg coal throughout this area is 22 to 26 inches. The Fire Clay-Whitesburg coal interval in this region is 35 to 40 feet.

THE GUN CREEK COAL

The Gun Creek coal is everywhere above drainage except in Town branch, Salyersville, but is a non-workable coal. It varies in thickness from a maximum of 18 to 20 inches in the lower part of State Road fork of Licking river to complete absence in much of the territory, especially that drained by Paint creek and its tributaries.

A thin flint fire-clay parting is frequently found in this bed, with a thickness of one-eighth to one-half inch.

At the head of State Road fork of Paint creek the thin flint fire-clay parting of the Gun Creek bed is found without any coal. The Gun Creek-Whitesburg interval varies from 45 to 65 feet.

THE TOM COOPER COAL

This coal comes above drainage at about the mouth of Mash fork and rises about with the rise of the stream up State Road fork of Licking river, keeping just above stream level. It rises up Horsepen fork of State Road fork to within half a mile of its head and goes below drainage about one-half mile up the left or main fork of State Road fork.

On Mash fork it is below drainage until just below the mouth of Burton fork. It is above drainage on the right fork of Mash fork for three-fourths mile and on Burton fork as far as the forks.

It is everywhere above drainage on Paint creek and its branches from one-fourth mile below the mouth of Little Paint fork to Oil Springs. It is above drainage on these branches until their heads are reached. The thickness varies from a minimum of 2 inches to a maximum of 22 inches. The average thickness is probably about 14 inches. The Tom Cooper-Whitesburg interval in this region is 95 to 100 feet.

THE LACEY CREEK COAL

Although this is a thin coal, it is frequently opened. It is above drainage on Paint creek and its tributaries as far up as the mouth of Little Paint fork of Paint creek and on the branches of Paint creek to a point near their heads. It shows at drainage level at the mouth of Burton fork of Mash fork, but soon dips below drainage, the dip of this bed down Mash fork being greater than the fall of the stream.

The Lacey Creek coal attains a maximum thickness of 30 inches opposite the mouth of Isaiah fork of Paint creek. It has a minimum thickness of 10 inches just above the mouth of Burton fork of Mash fork. It has an average thickness of 22 to 25 inches over most of the area in which it is above drainage. The bed has never been found parted. It is distinguished from the overlying Tom Cooper coal by having, at most, only about six inches of dark-gray, bituminous, sandy shale, and never the thickness of black, fissile shale which the Tom Cooper coal frequently has. The Lacey Creek coal rarely has a black shale roof. The interval between the Lacey Creek coal and the Tom Cooper coal is 35 feet.

THE WILLIAMS COAL

This coal has only been exposed in one place near the head of State Road fork of Paint creek. The bed is here 8½ inches thick. The Williams-Lacey Creek coal interval is 40 feet. The area of this coal is only slightly larger than that of the Wheelersburg. It is above drainage only on State Road fork and Panther Lick branch of Paint creek, and is of no economic importance.

THE WHEELERSBURG COAL

This coal is below drainage in all portions of this area except Paint creek within 1 mile of Oil Springs and on State Road fork and Panther Lick branch of Paint creek. It goes under drainage 1¾ miles up State Road fork of Paint creek. On Panther Lick branch it goes under drainage three-fourths mile up.

It is a thin coal never of workable thickness. Where exposed on State Road fork of Paint creek it was 11 inches thick, on Panther Lick branch near the mouth it was 9½ inches thick. The interval of this coal to the Lacey Creek coal is 70 to 80 feet.

STRUCTURE

There is a pronounced dip down State Road fork and down Mash fork and from the heads of these streams to their mouths. There is also a marked dip down the branches of Paint creek which head in Magoffin county. The approximate crest of the anticline on whose flanks these dips are located passes from the head of Litteral fork of Mine fork at the county line to the head of Mash fork. This crest line bears slightly west of north. In its northern portion it is not a well defined sharp-crested anticline, but rather a broad area of high strata. This appears to be due to the crossing of an anticline whose crest is nearly east and west and whose crest line passes through Oil Springs, with the above-mentioned nearly north-south anticline.

DETAILED DISCUSSION OF THE COALS

Approximately 1 mile above the mouth of State Road fork the stream forks; the left fork is known as State Road fork, the right as Mash fork.

A small left tributary to Licking river, known as Town fork, runs through the town of Salyersville and empties into the river a few hundred yards below the mouth of State Road fork. A section on this branch is as follows:

Section

	Feet	*Inches*
Massive, hard, fine-grained sandstone	40	
Bench		
Thin-bedded sandstone grading into gray, sandy shales	60	
Light-gray, sandy shale and shaly sandstone	45	
Covered interval	10	
Top of Fire Clay coal bed. . . . . Elevation	960	
Light-gray sandy shale	20	
Covered interval	10	
Whitesburg coal bed { Black shale		
Coal 11"—18" } Elevation	930	
Shaly sandstone and sandy shale	30	
Coal bed { Block coal		19
Light-gray shale		43
Coal		5½
Gray, sandy shale and dark shale	11	
Coal bed { Coal		18
Light-gray shale		1
Coal		2½
Covered interval, probably largely sandy shale	16	
Gun Creek coal. . . . . Elevation	872	3+
Shaly sandstone	8	
Dark-gray shales with disc-shaped calcareous concretions—4 feet. . . . . Elevation	860	

The Fire Clay coal is the only workable coal opened on this branch and is opened in a number of places, showing from 28 to 46 inches of coal.

S. O. Arnett has two adjacent openings into the Fire Clay coal within 100 yards of the mouth of the first right branch on Town branch. The bed section, in a 20-yard opening, is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone		
Light-gray, soft shale mixed with coal		13
Splint coal		5
Block coal		16
Flint fire clay		3
Block and splint coal mixed		12
Carbonaceous shale		5
Elevation	960	

Within 15 yards of this entry are two completely caved openings, also owned by S. O. Arnett. Just above the second of these caved openings another opening by S. O. Arnett gives the following bed section:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-gray sandy shale		
Splint coal		2½
Hard, dull, splinty coal		5
Splint coal		4½
Flint fire clay		4½—5
Block coal with thin interlaminations of cannel coal		18
Elevation	960	

On the right of this branch there are 4 completely caved openings into the Fire Clay coal. These openings were said to have had considerable cannel coal in the lower portion of the bed.

Just above the mouth of this branch, on the left of Town branch, John Gardner has an opening into the Fire Clay coal with the following bed section:

Fire Clay Coal

	Feet	Inches
Thin-bedded massive sandstone		
Light-gray clay shale	3	
Bituminous clay slate,—"draw slate"		8
Splint coal		12
Block coal		14
Flint fire clay		2
Block and splint coal		14
Light-gray, clay shale floor		
Elevation	960	

One hundred yards up the branch, on the right, Frank Atkinson has a partly caved opening into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-gray sandy shale		
Bituminous clay slate with coal interlaminations		8
Block coal		23½
Flint fire clay		2
Splint coal		15½
Light-gray, soft shale floor		
Elevation	952	

One hundred and twenty yards above this opening Pliney Patrick has a 20-yard entry into the Fire Clay coal on the right of a small left drain. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	2	
Light-gray, soft clay shale		
Block coal		21
Flint fire clay		3
Block coal		12
Light-gray shale		
Elevation	957	

One hundred yards up the right fork of Town branch, on the right, Matt Patrick has a wet, 30-yard entry, into the Fire Clay coal. A partial section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	1½	
Light shale with plant imprints	3½	
Bituminous clay slate		9
Coal, containing flint fire-clay parting (probably 2 - 5 inches)		39+
Elevation	950	

The coal is probably not more than a few inches thicker, if any, than given in this section.

Eighty feet up on the same side Matt Patrick has another opening into the same bed. The bed section is as follows:

Fire Clay Coal

	Feet	*Inches*
Light gray, sandy shale, bituminous at base		
Bituminous clay slate		9
Block coal		17½
Flint fire clay		4½
Block coal		14
Dark, sandy, shale floor		
Elevation	955	

Ninety yards up this fork, on the right, Wayne Cooper has two openings into the Fire Clay coal. The bed section, in a 35-yard entry, is:

Fire Clay Coal

	Feet	Inches
Yellowish-gray sandstone	5	
Olive-gray shales	3	
Hard, dull splint coal		11
Block coal		22
Flint fire clay		2½
Coal		13
Light-gray shale		
Elevation	950	

Wayne Cooper has another 25-yard entry into the same bed 60 feet up on the same side. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive, cross-bedded sandstone	9	
Light-gray shale	3	
Impure clayey coal		9
Block coal		24
Flint fire clay		1½
Block coal		11½
Elevation	953	

STATE ROAD FORK

A low split of the Whitesburg coal, a bed coming 60 feet below the Fire Clay coal, shows in natural exposure on the left of the State Road Fork road, one-fourth mile from Salyersville. The bed section is:

Whitesburg Coal

	Feet	Inches
Hard- black, sandy shales	3	
Light-gray clay shales		
Block coal		14
Light-gray clay shale		2
Block coal		3½
Light-gray, clay shale		¼
Block coal		1¾
Elevation	900	

Five feet above this coal bed is a coal bed showing:

	Feet	Inches
Thin-bedded sandy shales	6	
Dark-gray to black shale		12
Light-gray, clay shale		7
Coal bloom (coal 6″±)		6
Elevation	905	

The following section was obtained on the first large left branch above Salyersville, up which branch the lower State Road Fork-Lick Creek trail passes:

Section

		Feet
Hazard coal bloom	Elevation	1243
Covered interval (largely sandy shales)		43
Bench		
Covered interval		10
Coal bloom	Elevation	1190
Light-gray, sandy shales		35
Faint coal bloom, Young coal	Elevation	1155
Covered interval		2
Prominent bench		
Covered interval		3
Fine-grained, light-gray massive sandstone		3
Covered interval		5
Massive sandstone		5
Sandy shales, becoming thin-bedded sandstone in the lower 5 feet of the interval		40
Trace Fork coal bloom	Thick-bedded clay shale 2′ Coal 6″± E.	1100
Shaly sandstone		30
Massive sandstone		15
Hamlin coal bloom with black shale roof	Elevation	1055

(This is probably the coal bed opened by Jeptha Hammond and mentioned below.)

Light-gray, sandy shale		5
Covered interval		2
Thin coal bed (low split of Hamlin)	Elevation	1048
Massive fine-grained sandstone		28
Fire Clay coal	Clay shale Coal 15″+ Elevation	1020
Hard, sandy shale		30
Light-gray, clay shale		3
Sandstone, somewhat shaly in places		23

The following section shows near the mouth of this branch:

Section

		Feet
Covered interval		60
Gun Creek coal bed	Massive sandstone 2½′ Light-gray, clay shale 2′ Block coal 16″ Light-gray, clay shale 4′ Ele.	904
Covered interval		19
Blue-gray, thin-bedded shales		15
Horizon of shales with disc-shaped calcareous concretions		

Jeptha Hammond has a coal opening 160 yards up a right fork at the head of this branch, in a right drain. The bed section is:

Hamlin Coal

	Feet	Inches
Massive sandstone		
Light-gray, clay shale	4	
Splint coal		7
Bone coal		5
Splint coal		6½
Light-gray, clay shale		¾
Splint coal		6½
Bone coal		4
Block coal		2½
Soft, gray, clay shale		6
Hard, white, massive sandstone	6	
Elevation	1055	

The bed is believed to be the Hamlin coal. The section is totally unlike that of any of the coal beds coming below the Fire Clay coal and the bed is probably the coal bloom shown in the preceding section at elevation 1050.

The following section was obtained up the first large left branch on State Road fork. The elevations corrected for dip:

Section

				Feet
Top of divide between State Road fork and Lick creek at head of the branch			Elevation	1225
Whittaker coal bloom			Elevation	1225
Covered interval				35
Massive sandstone, a thin deposit of limonite at base				40
Covered interval				50
Massive sandstone				40
Slight bench				
Covered interval				12
Fire Clay coal	Light-gray, sandy shale	1½'	Elevation	1023
	Dark shale	10"		
	Block coal	7"		
	Light-gray, clay shale.	1½"		
	Coal with considerable hard, dull coal	13½"		
Covered interval				27
Whitesburg coal	Massive sandstone	5'	Elevation	996
	Hard, black shale	1½'		
	Splint coal	8½"		
	Soft, gray, sandy shale floor			
Covered interval				17
Lower break of a bench				
Covered interval				25
Gun Creek coal	Hard clay shale	4'	Elevation	954
	Block coal	8"		
	Hard parting, resembles flint fire clay	1"		
	Block coal	3"+		
Covered interval				20
Dark-gray shales with calcareous concretions				15
Covered interval				5
Massive sandstone				25
Tom Cooper coal	Massive sandstone		Elevation	889
	Block coal	10"+		
Interval, largely sandstone, somewhat calcareous				35

The Fire Clay coal is opened in only one place. This is an opening by A. T. Patrick, 170 yards up the first right branch below the head of the branch in a right drain. The bed section is as above. The elevation of the bed is 1023. No flint fire clay showed in the bed, but it is either the Fire Clay bed or a low split of that bed.

The Gun Creek coal has been opened in one place and prospected in another and raised from the bed of the branch in yet another. Alex. Adams has a 6-foot wet entry into this bed 100 yards up the first small right hollow on this branch. A partial section is:

Gun Creek Coal

	Feet	Inches
Light-gray, clay shale	4	
Block coal		8
Hard parting resembling flint fire clay		1
Block coal		3+
Elevation	970	

The coal may be 4 to 5 inches thicker. A completely caved opening into the same bed shows 60 feet up the branch on the same side.

Coal has been raised from this bed 250 yards up the first right branch below the head of this branch. A partial section here is:

Gun Creek Coal

	Feet	Inches
Light-gray, clay shale	3	
Coal		18+
(Contains a thin, hard, flint fire-clay parting one-half inch thick)		
Elevation	956	

The Gun Creek coal has been prospected by Leek Conley at the head of this branch. The prospect is 150 yards up on the right of the right fork. A partial section is:

Gun Creek Coal

	Feet	Inches
Black shale		
Coal		5+
Elevation	920	

The Tom Cooper coal occurs in natural exposure in the bed of the stream at elevation 907. It shows 10″+ of block coal under massive sandstone.

The following section was obtained on State Road fork, 1¼ miles above the point where Mash fork joins

State Road fork, in a right hollow on the land of Mrs. Elizabeth Tackett:

Section

			Feet
Low split of Young coal, now caved, reported 4 feet thick		Elevation	1195
Covered interval			85
Hamlin coal bloom, black slaty shale shows in dump		Elevation	1110
Covered interval			37
Fire clay coal	Massive sandstone ...12' Block coal .... 6"	Elevation	1073
Whitesburg coal	Massive sandstone .12' Block coal .... 6"	Elevation	1035
Gun Creek coal	Light-gray, sandy shale Coal ....16"+	Elevation	975
Tom Cooper coal	Black shale .... 2' Coal, reported ....24"	Elevation	925

The upper trail from State Road fork to Lick creek goes up the third large left branch of State Road fork. A section taken at the head of the right fork of this branch, where the trail to Lick creek climbs the hill, follows:

Section

		Feet	Inches
Top of trail—massive sandstone	Elevation	1232	
Massive sandstone		24	
Covered and bench		10	
Massive sandstone		51	
Covered interval		45	
Black shale			6+
Covered interval		5	
Bench, upper break			
Covered interval		37	
Interval with 10+ feet of massive sandstone in the upper part		15	
Bench, upper break			
Covered interval		26	
Massive sandstone		3	
Place of Whitesburg coal	Elevation	1016	
Light-gray, clay shale		21	
Covered and bench		10	
Massive sandstone		58	
Soft, gray shales with disc-shaped calcareous concretions		12	
Massive sandstone		7	
Tom Cooper coal { Black shale Thin coal }	Elevation	908	

The lower portion of this section was taken going up the branch and the 58 feet of sandstone may be too great a thickness.

The Whitesburg coal was opened by Mr. Tackett in a left hollow opposite the right fork of this branch. The opening is completely caved, but the section was reported to have been as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Black shale	2	
Stone coal		6
Light-gray shale		12
Coal		8
Hard rock		4
Slate and coal		
Light-gray, shale floor	Elevation	1016

SMITH ADAMS' BRANCH

First large left branch below Falcon. One hundred feet up this branch, in the bed of the stream, the Tom Cooper coal shows in natural exposure as follows:

Tom Cooper Coal

	Feet	*Inches*
Dark-gray shale	1½	
Block coal		5
Elevation	895	

The Whitesburg coal is opened by Smith Adams one-half mile below the head of a right fork of this branch, on the right of a small left drain. The Whitesburg coal here shows its greatest thickness in the county. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Light-gray, hard, sandy shale		
Black shale	3	
Soft, bright, block coal		12
Coal with much hard, dull coal interlaminated		39½ to 40
Block coal		12 to 14

The lower 12 to 14 inches was reported to be shop coal of excellent quality. This coal is set apart from the rest of the bed and sold for a higher price.

The roof of the bed is excellent. The opening is driven in 150 feet and opens out into a large room. The bed dips N. 60° E. at the rate of 2½ feet in 80 to 100 feet.

A number of openings, now completely caved, have been made into this bed on this branch. It was reported that nowhere else, even in openings near the one whose bed section is given above, was the bed found as thick. Elsewhere in this branch the Whitesburg coal has been reported with less than 30 inches of coal.

The following section was obtained 170 yards above this opening on the left bank of the branch:

Section

	Feet	Inches
Base of the highest steep bench on the hill		
Covered interval	10	
Top of bench		
Covered interval	35	
Lower break of bench		
Massive, coarse-grained sandstone	10	
Coal 2 inches thick immediately under the massive sandstone—Fire clay rider .....Elevation	1117	
Shaly sandstone	5	
Massive sandstone	12	
Fire clay coal bed, 16 inches thick .....Elevation	1100	
Sandy, micaceous shale	15	
Fine-grained, massive sandstone		20
Covered interval	15	
Whitesburg coal: Black fissile shale ....27″ Coal bloom—bed ....27″ Maximum thickness	E. 1050	
Shale	3	
Massive sandstone	12	
Shaly sandstone	15	
Covered interval, probably largely sandstone....	40	

There is a strong dip down the right fork of this branch.

From the mouth of the last-mentioned left branch to the mouth of the next left branch, two-fifths mile upstream, is a zone of disturbed strata. Inclinations of strata as high as 16° in a direction N. 70° E. were noted, and gentle folding of the beds on a small scale occurs. The general dip is upstream. No faults were noted and no faults of a throw greater than 30 feet can exist.

The Whitesburg coal has been opened by Sam Collins at the head of the first left branch below Falcon and two-fifths mile above the Smith Adams branch. The bed section here is:

Whitesburg Coal

	Feet	Inches
Soft, thin, clay shales	2	
Bituminous clay shale		30
Soft, bright, block coal	10	
Coal with much hard, dull coal interlaminated with brighter block coal		22
Elevation	1048	

The roof here is excellent. The opening is 150 yards deep with a left room 70± feet wide.

A section on this branch is as follows:

Section

		Feet	*Inches*
Upper break of bench	Elevation	1110	
Massive sandstone		15	
Fire clay coal—less than 4 inches	Elevation	1095	
Covered interval		30	
Light-gray, sandy shales		5	
Massive, fine-grained sandstone			20
Soft, thin, very argillaceous shales		15	
Black shales			30
Whitesburg coal 32 inches	Elevation	1048	
Covered interval		28	
Massive, fine-grained sandstone		20	
Covered interval		30	

Section Continued Down the Branch

				Feet
Place of Gun Creek coal			Elevation	970
Covered interval				15
Soft, gray, shale				4
Light-gray, clay shale with some ferruginous concretions				9
Coal	Black shale	22 "	Elevation	940
	Block coal	6½"		
	Black, sandy, bituminous shale	4 "		
Covered interval				5
Soft, gray shales with calcareous concretions				12
Tom Cooper coal	Black slate	4 "	Elevation	913
	Block coal	1½"		
	Soft, gray shale	7 "		
	Massive sandstone			

One-fifth of a mile above the mouth of this branch there is a right fork of State Road fork, known as Horsepen fork.

HORSEPEN FORK

Three hundred and fifty yards up Horsepen fork the following section was obtained:

Section

				Feet
Top of section			Elevation	1004
Sandy shale with ferruginous concretions				8
Shaly sandstone				6
Fine-grained, massivve sandstone, shaly in places				22
Tom Cooper coal bloom	Black shale		Elevation	968
	Coal bloom	14"+		
Massive sandstone				14
Light-gray, sandy shales				6
Coal bed	Light-gray shale		Elevation	948
	Coal	2"		
	Light-gray, clay shale			

The Tom Cooper coal has been prospected by the side of the road, 700 yards up Horsepen fork. The bed section here is:

Tom Cooper Coal

	Feet	*Inches*
Shaly sandstone	6	
Dark-gray to black shale	1½	
Soft, bright, block coal		8½
Block coal with considerable hard, dull coal interlaminations		11
Elevation	950	

A section up the Horsepen side of the trail leading from Horsepen to Middle fork of Mash fork is as follows:

Section

	Feet
Top of trail on massive sandstone at ....Elevation	1151
Massive sandstone	6
Covered interval	40
Upper break of long bench	
Massive sandstone	5
Coal bloom (thin) ....Elevation	1100
Covered interval	3
Massive, ledge-forming sandstone	22
Whitesburg coal bloom { Black, slaty shale..1½' Coal bloom } Elev.	1075
Covered interval	20
Massive, fine-grained sandstone	20
Covered interval, largely clay shales, carrying ferruginous concretions in the lower portion	82
Tom Cooper coal bloom in bed of stream at base of road ....Elevation	963

Eleven hundred yards up Horsepen fork the Tom Cooper coal goes below drainage in the bed of the stream.

Two hundred yards above this point, on the right of the stream, the following section was obtained:

Section

	Feet
Massive sandstone	4
Covered interval	10
Shaly sandstone	11
Thin-bedded, sandy shale	7
Dark-gray to black, sandy shale—7 feet ......Elevation	978

Four hundred yards up a small left branch, opposite this point, the Whitesburg coal has been opened, on the right, by Frank Conley. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	1½	
Black slate	4½	
Shaly coal		6½
Block coal with much hard, dull coal		13
Elevation	1080	

One mile up Horsepen fork and 300 yards up a left branch, on the right of the branch, Jillson Conley has an opening into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	6	
Black slaty shale	3½	
Soft, bright, block coal		7½
Block coal with much hard, dull coal		13
Elevation	1070	

Pyrite replacing a thin seam of charcoal and preserving the texture of the charcoal occurs in this bed.

The following section was made on the left side of the branch at this point:

Section

Base of massive sandstone, weathered in smooth faces Elevation	1193
Covered interval	5
Bench—place of Haddix coal	
Covered interval	30
Good bench	
Covered interval	58
Slight bench	
Covered interval containing a massive sandstone, showing in ledges	42
Bench Elevation	1058

Two hundred feet above the mouth of Horsepen fork, on the right, the Tom Cooper coal has been opened by Jillson Conley. The bed section is:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	6	
Hard, black shale		14
Laminated block coal		20
Elevation	952	

A thin coal shows below this opening as follows:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	12	
Block coal		2
Elevation	940	

Three-fourths of a mile up State Road fork, on the left of the road, the Tom Cooper coal shows in natural exposure as follows:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	3	
Dark-gray to black shale	1	
Block coal		19
Elevation	960	

One-half a mile up State Road fork a trail to Mine fork passes up the first large left-hand branch above Falcon. One hundred and fifty yards up this branch, in the bed of the stream, the Tom Cooper coal shows. A partial section is as follows:

Tom Cooper Coal

	Inches
Dark-gray to black shale	4+
Block coal	12+

One-fourth mile up this branch is a small right branch. One hundred yards up this branch, in a right drain, Kelly Adams has two completely caved openings into the Whitesburg coal at elevation 1048.

The following section was obtained on a hillside on the right of this branch opposite the mouth of the above-mentioned drain:

Section

		Feet
Prominent bench	Elevation	1209
Covered interval		71
Bottom clay beneath massive sandstone	Elevation	1138
Covered interval		38
Heavy coal bloom—Fire clay coal	Elevation	1100
Covered interval		29
Whitesburg coal bloom	Elevation	1071
Covered interval		71
Gun Creek coal bloom	Elevation	1006

Two hundred and fifty yards above this point, at the head of this branch, on the left, Doe Hale has a completely caved opening into the Whitesburg coal at elevation 1072.

One hundred and seventy yards up the main road which leads to Lick creek, above the mouth of this right branch, Abe Caudill has an opening in a left hollow at the point where the road makes a sharp turn as it starts the ascent of the hill. The opening into the Whitesburg bed is 50 yards up a small right drain. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Light-gray, clay shale	4	
Dense, black, shale	3½	
Soft, bright, block cal		8
Block coal with considerable hard, dull coal		14
Light-gray, soft, clay shale		½
Block coal with considerable hard, dull coal		4½
Elevation	1067	

The following section was obtained on the road to Mine fork and Lick creek from State Road fork of Licking river. The section was made on the State Road fork side of the divide:

Section	Feet	
Heavy coal bloom in white bottom clay on the summit of the divide—low split of Young coal ...... Elevation	1236	
Shaly sandstone	5	
Massive sandstone	23	
Bottom clay—Trace Fork coal ...... Elevation	1208	
Covered interval	15	
Bottom clay and black shale—Haddix coal.... Elevation	1193	
Thin-bedded sandstone	5	
Hard, sandy shales	10	
Bench		
Covered interval	2	
Light-brown, clay shale	20	
Massive sandstone with shell of limonitic iron ore at the base	33	
Coal Block coal ....7″ Shale ....6″ Block coal ....8″ Elevation	1123	Fire clay coal
Shale with 2-foot bed of fine-grained, massive sandstone.	6	
1-inch coal ...... Elevation	1117	
Shale	4	
8-inch coal ...... Elevation	1113	
Covered interval	3	
Light-brown shales	12	
Coal bloom—Coal appears about 9 inches thick. Elevation	1098	
Light-gray shales	10	
Massive, fine-grained, sandstone	8	
Covered interval	3	
Whitesburg coal bloom ...... Elevation	1074	
Light-gray shale	5	
Massive sandstone	49	
Covered interval	8	
Gun Creek coal Block coal ....1½″ Light-gray shale ....5 ″ Coal ....½″ Light-gray shale ....3 ″ Block coal ....1½″ Elevation	1012	

Just above a small church on the right of State Road fork a road branches off to Panther Lick branch of Paint creek. One-eighth mile up the road, on the left, a faint coal bloom shows with a little black slate over the coal and, 1½ feet up, the base of a massive sandstone bed. Some questionable flint fire-clay float shows here at elevation 1005. This is the Gun Creek coal and the thin one-fourth to one-half inch seam of flint fire clay represents the flint fire clay which is often found in this bed in the extreme north portion of the county.

Five hundred yards up this road, in a small right hollow, Peter Caudill has a 15-foot entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	2	
Black, slaty shale	3½	
Soft, bright, block coal		1
Bituminous shale		¼
Soft, bright, block coal		4
Block coal with much hard, dull coal		20
Elevation	1086	

This bed here is on a bench next to the highest bench. Over this higher bench is a prominent cliff-forming sandstone—the massive sandstone below the Young coal. This massive sandstone occurs at elevation 1180 and is 20 feet thick. There is a conspicuous inclination of strata N. 50° E. here.

Three-eighths mile up this branch the Whitesburg coal has been opened by Mr. Boarder at elevation 1102. The opening is completely caved.

The following section was obtained on the road going over the divide to Panther Lick branch:

Section		Feet
Top of hill to the right of the road on massive sandstone	Elevation	1400
Massive sandstone		13
Covered interval		42
Bench		
Covered interval—place of Hazard coal		10
Top of massive, cliff-forming sandstone	Elevation	1335
Massive, coarse-grained sandstone—stands out in prominent cliffs		35
Covered interval		43
Massive sandstone		12
Black shale		
Covered interval		32
Massive sandstone		1
Covered interval		14
Massive sandstone		43
Fire clay coal bloom	Elevation	1155
Covered interval		7
Bench		
Covered interval		40
Place of Whitesburg coal	Elevation	1108
Shaly sandstone		8
Massive sandstone		25
Bottom clay	Elevation	1075
Covered interval		12

One mile above Falcon, on the left, Abe Caudill has a completely caved opening into the Hamlin coal at elevation 1145.

MASH FORK

On the left of the road, 150 yards up Mash fork, the Gun Creek coal shows in natural exposure. The bed section is as follows:

Gun Creek Coal	Feet	Inches
Light-yellow, sandy shale		8+
Soft, bright, block coal		8½
Light-gray, soft, clay shale		1¼
Soft, bright, block coal		3
Light-gray, clay shale	2	
Elevation	872	

Three-fourths of a mile up Mash fork, on the left of the road, black, sandy shales with calcareous concretions and interlaminations occur at elevation 860. These are the soft, concretionary shales which come a short distance above the Tom Cooper coal.

Seven-eighths mile up Mash fork the following section was obtained on the left of the road:

Section

	Feet
Lower break of prominent bench ....Elevation	1022
Covered interval	5
Covered interval with a hard, massive sandstone in the upper portion	40
Massive sandstone	30
Covered interval	15
Light-gray, clay shales	18
Massive sandstone	7

One and one-eighth miles up Mash fork, just before a sharp bend in the road, the Gun Creek coal shows in natural exposure. The bed section is:

Gun Creek Coal

	Feet	Inches
Massive sandstone ledge	7	
Block coal		12½
Elevation	915	

Two and four-fifths miles above the mouth of Mash fork the stream forks. The right fork is known as Mash fork, the left fork as Burton's fork.

Two hundred yards up the right fork at stream level the Lacey Creek (Litteral Fork) coal shows in natural exposure. The bed section is as follows:

Lacey Creek Coal

	Feet	Inches
Massive sandstone	1	
Block coal		6
Soft, light-gray, clay shale		
Elevation	910	

The following section was obtained 550 yards up Mash fork, on the left, on the road leading from Mash fork to Rockhouse fork of Burning fork:

Section

		Feet
Massive sandstone		12
Covered interval		37
Bench		
Covered interval, massive sandstone in lower portion		48
Covered interval		3
Place of Haddix coal	Elevation	1162
Light-gray, sandy shale		6
Massive sandstone		9
Bench		
Covered interval		5
Bottom clay—place of Hamlin coal	Elevation	1142
Massive sandstone		39
Covered interval		3
Prominent bench		
Covered interval		5
Heavy coal bloom (Fire clay coal)	Elevation	1095
Covered interval and coal float		9
Light-gray, clay shales		5
Massive sandstone		13
Shaly sandstone		10
Whitesburg coal bloom	Elevation	1052
Massive sandstone		2
Shaly sandstone		16
Massive sandstone with large calcareous concretions		6
Light-gray, sandy shales		10
Massive sandstone		8
Covered interval		2
Gun Creek coal bloom	Elevation	1000
Covered interval		70
(Place of Cooper coal about at 950)		
Massive sandstone		15

Four hundred yards above this the following section shows below the Tom Cooper coal on the left of Mash fork:

Section

		Feet	Inches
Tom Cooper coal	Elevation	944	
Covered interval		5	
Gray, sandy shale with calcareous concretions		3	
Covered interval		16	
Fine-grained, light-gray to white sandstone		3	
Thin-bedded white sandstone		1	
Soft, gray, sandy shale			6+
Stream level			

At this place excellent examples of low angle cross-bedding and abrupt transitions between shale and massive sandstone show. The roof of the Tom Cooper coal has changed in a distance of 300 yards from shaly sandstone, nearly massive, with 2 inches of black shale, to light-gray, sandy shale underlain by 26 to 32 inches of black shale.

Two-thirds mile up Mash fork the Tom Cooper coal has been prospected by Frank Prater at the mouth of a left branch. The bed section is:

Tom Cooper Coal

	Feet	*Inches*
Shaly sandstone	8	
Black shale		2±
Laminated splint and block coal		20
Elevation	937	

This coal bed is sharply folded and the north limb of this fold dips up the stream at a rate of 3½ feet in 24 feet.

The strata are considerably disturbed at and above the prospect in the bed of the branch. A well 250 feet north of this coal prospect was reported to have been sunk 14 feet deep without encountering the coal bed. The mouth of the well is 5 to 6 feet higher than the coal bed. Folding of strata on a very small scale shows in the bed of this left branch 170 yards above the coal prospect.

One-half mile up this left branch, at the head of the left fork, the Haddix coal has been opened by Frank Prater. There are two adjacent openings here, one fifty yards from the other. The downstream opening is partly caved and is wet.

On the Burton fork side of a small knob and 150 yards northwest of these openings the same bed has been opened and shows 45½ inches of coal with 3 inches of parting. The bed section of the Haddix coal in this locality will be given when Burton fork is being described.

A combined section on this left branch of Mash fork is as follows:

Section

	Feet
Light sandstone, weathers in smooth-faced edges	4
Haddix coal 45½ inches ... Elevation	1160
Covered interval	5
Bench at base of knob	
Covered interval	55
Slight bench	
Covered interval	10
Fire clay coal bloom, no flint fire clay found ... Elevation	1090
Covered interval	60
Whitesburg coal bloom with heavy black shale roof Elevation	1030
Covered interval	10
Coal bloom—split of Whitesburg ... Elevation	1020
Covered interval	4
Fine-grained, massive sandstone	6
Covered interval	25
Gun Creek coal bloom ... Elevation	985
Covered interval—largely shaly sandstone	14
Soft, dark-gray, shales with disc-shaped calcareous concretions	30
Covered interval	6
Tom Cooper coal: Shaly sandstone ... 8′ Black shale ... 2″± Coal ... 20″ ... Elevation	937

From one mile up Mash fork to the forks the stream runs on the soft, dark-gray, sandy shales with calcareous concretions which come over the Tom Cooper coal.

Six hundred yards up the right fork of Mash fork, on the right, the Whitesburg coal has been opened by Harry Powers. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	20	
Hard, black shale		8
Soft, bright, block coal		5
Block coal with considerable hard, dull coal interlaminations	17	
Elevation	1050	

The bloom of the Whitesburg coal shows in natural exposure on the right of the road on the left fork of Mash fork. A partial section is:

Whitesburg Coal

	Feet	Inches
Black shale	3	
Coal bloom		9+
Elevation	1025	

There are indications here that the bed is parted, as several thin coal blooms were found within a distance of 10 feet below this bed.

Coal has been raised from the Whitesburg bed 700 yards up this fork and 60 yards up a left branch on the land of Daniel Harmon. The coal was reported to be 18 inches thick with a black slate roof 1 inch thick. The elevation of the bed is 1,030 feet.

Three-eighths mile up this branch, on the right, a bed near the Fire Clay coal horizon showed in natural exposure. The bed section is:

Fire Clay Coal Rider (?)

	Feet	*Inches*
Massive sandstone	5	
Hard, black shale	1½	
Block coal		13
Dark-gray to black, soft, shale		3
Sandstone		7+
Elevation	1080	

Three hundred yards above this point coal has been dug from the bed of the stream from the same bed. The roof alone is partly exposed. The coal was reported to be 3 feet thick.

Three-fourths mile up this left fork of Mash fork Wib Perkins has an opening into a coal bed at the Fire Clay coal horizon. The opening is on the left of the stream just below his house. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Light-gray, clay shale	7	
Block coal		11
Medium-gray shale		2
Soft, bright, block coal		15
Elevation	1100	

This bed section is very much like the section of a coal prospected at the head of Rockhouse fork of Burning fork by Mr. Williams. The Williams coal on Rockhouse fork comes 40 to 50 feet above the Whitesburg coal as does this coal. No flint fire clay was found in this bed; it is lacking here as it is elsewhere in this region.

Directly across from this Fire Clay coal opening is a completely caved opening at elevation 1100 into a bed which is probably the Fire Clay Rider. There is a slight dip from the left to the right side of the branch here, so that this bed comes slightly higher stratigraphically than the bed on the left. A section at this point is as follows:

Section

		Feet
Flag coal bloom reported just under a 20-foot massive sandstone ledge, capping the high point to the right of the road	Elevation	1390+
Covered interval		140
Coal bloom under massive sandstone	Elevation	1250
Covered interval		32
Coal bloom	Elevation	1218
Covered interval		58
Haddix coal bloom	Elevation	1160
Covered interval		58
Haddix coal bloom	Elevation	1160
Covered interval with massive sandstone in lower portion		50
Thin coal bloom under massive sandstone	Elevation	1120
Light-gray, sandy shale		4
Coal bloom with much black slate mixed with the coal (Fire clay rider)	Elevation	1116
Covered interval		25
Fire clay coal bloom	Elevation	1090

BURTON FORK

Burton fork is the left fork of Mash fork. One thousand yards up Burton fork is a small right branch. Henry Lemaster has several openings into the Haddix coal at the base of a knob at the head of this branch. These are the openings into the coal which in the older reports of the Kentucky Geological Survey was known as the Henry May coal. The three openings there are within a distance of 200 feet of one another. The two end openings are completely caved, but the middle opening, though caved and wet, gave the following partial section:

Haddix Coal

	Feet	*Inches*
Massive sandstone	4	
Light-gray, clay shale		1
Soft, bright, block coal		2
Light-gray, clay shale		5
Soft, bright, block coal		7
Light-gray, soft, clay shale		2
Block coal with some interlaminations of hard, dull coal		19
Dark-gray, soft shale		3
Coal—lower portion cannel coal, reported to be 8 inches thick		26½
Light-gray, soft, shale floor		
Elevation	1155	

The bottom 14 inches of this bed was under water. The stone coal of the lower portion was said to be shop coal. This is undoubtedly the same bed for which Crandall—Bull. 10, K. G. S., p. 28—gives the following bed section:

May Coal

	Inches
Roof, dark slate to sandstone	
Coal	19
Bone and bituminous shale	4
Coal	24
Cannel coal	7
Coal	1

It will be noted that in Crandall's section the lower portion of the bed is 32 inches thick, while in the section given above it is but 26½ inches thick. Though the lower half was in water it is thought reasonably certain that the floor of the bed was reached and the discrepancy between the two measurements is due to variation in the bed section at the two points at which measurement was made.

Three-fourths of a mile up Burton fork, at its forks, the following section was obtained, on the road going to Horsepen fork of State Road fork:

Section

	Feet
Light-gray, clay shale	18
Massive sandstone	2
Thin-bedded, yellowish shale	13
White sandstone, slightly shaly	30
Covered interval, largely shale with a massive sandstone ledge 12+ feet thick in the lower portion	35
Tom Cooper coal raised from stream bottom—black shale roof ....Elevation	950

The Tom Cooper coal is here less than 2 feet thick with the characteristic black shale roof.

The left fork of Burton fork is known as Middle fork. Three-fourths of a mile up Middle fork Sam Stephens has a completely caved opening, on the right, into the Whitesburg coal. The characteristic black shale roof shows 2½+ feet thick. The coal was reported to be 36 inches thick. A stake driven down here below the top of the coal reached the apparent floor of the bed at 31½-inch depth. The elevation of the opening is 1035 feet.

The Whitesburg coal is again opened at the head of the left fork of Middle fork by Sam Stephens. A bed section here is:

Whitesburg Coal

	Feet	*Inches*
Black shale	2½	
Soft, bright, block coal		5
Soft clay shale		¼
Block coal with considerable hard, dull coal interlaminations		12
Elevation	1070	

PAINT CREEK

Only those branches on the right of Paint creek above Oil Springs head in Magoffin county.

STATE ROAD FORK OF PAINT CREEK

This branch has its mouth at Oil Springs postoffice. In the bed of the branch below the Magoffin county line the following section was made:

Section	Feet
Light-gray, shaly sandstones	5
Covered interval	5
Massive, fine-grained, hard sandstone	3
Calcareous concretions in sandstone ....Elevation	868

There is a marked downstream dip on this branch.

The Tom Cooper coal has been opened by Corley Conley, at elevation 1000, at the head of the right fork of the first left branch above the county line. The mouth of the branch is just at the county line. The opening is completely caved.

Three hundred yards up this branch, on the left, is a completely caved opening into the Lacey Creek coal, also by Corley Conley. Black shale shows on the dump. The elevation of the opening is 973 feet. Directly opposite on the right-hand side of the branch is a caved opening into the same bed at elevation 983.

On the right side of the mouth of a small left hollow three-fourths mile up State Road fork an opening was seen which appeared to be caved. The Lacey Creek coal was reported to have 22 to 24 inches of cannel coal, which in a nearby entry into the same bed has changed to stone coal.

In a small right hollow, back of the first right-hand house, in Magoffin county, 1 mile up State Road fork of Paint creek, George Helton has a 25-foot entry into the Lacey Creek coal. The opening is 250 yards up on the left. The bed section is:

Lacey Creek Coal	Feet	Inches
Massive sandstone	6	
Shaly sandstone	4	
Sandy, black shale		4
Soft, bright, block coal		20½
Medium-gray, shale floor		
Elevation	1017	

One hundred and twenty yards N. 65° E. of the above-mentioned opening is an opening into the same bed 8 feet lower than the above entry.

Two hundred feet up this hollow, on the left, and 100 feet below the opening at elevation 1017, the same bed has been opened, also by George Helton. The bed section is:

Lacey Creek Coal

	Feet	Inches
Brown, shaly sandstone		
Block coal		23½
Light-gray, clay shale floor		
Elevation	1012	

In a small left branch, one and one-third miles up the fork, and back of the first left house below the church, Fred Brown has a 15-yard entry into the Lacey Creek coal. The opening is one-fourth mile up the branch at the head of a small left drain. The bed section is:

Lacey Creek Coal

	Feet	Inches
Thick-bedded, light-gray, clay shale	4	
Splint coal		24 to 26
Light-gray, clay, shale floor		
Elevation	1020	

A caved opening shows directly across the branch, due west of this entry, at the same elevation.

At the head of this branch, on the right, on the top of the hill, at an elevation estimated to be 1,300 feet, is the base of a massive sandstone ledge which stands out on the hilltop prominently in this region. This is the massive sandstone below the Young coal.

In a right branch directly opposite this left branch John Henry Richards has several adjacent openings into the Lacey Creek coal. The openings are on a right drain 400 yards up the branch. There are three closely adjacent 20-yard entries into the coal here. The bed section is as follows:

Lacey Creek Coal

	Feet	Inches
Fine-grained, massive sandstone	2	
Soft, bituminous shale		12½
Soft, bright, block coal		24
Light-gray, clay shale		
Elevation	1035	

One thousand yards up this branch, in a left drain, the Whitesburg coal has been opened in a 25-foot entry by John Henry Richards. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	3	
Hard, black shale	4	
Coal 32½ inches—25 inches, average		27
Gray, sandy, shale floors		8
Elevation	1140	

On the divide between this branch and the next right branch above the Whitesburg coal has been opened, 400 yards from the stream, by J. I. Gullett. The bed here gives the following bed section:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Hard, black shale	5	
Soft, light, block coal		20
Coal with considerable hard, dull coal interlaminations		20
Light-gray, clay shale		
Elevation	1132	

Three-quarters of a mile above the county line a road to Litteral fork and Pigeon creek passes up a right branch. Six hundred and fifty yards up this branch, on the left, the Lacey Creek coal is opened in a 12-yard entry by Gullett. The bed section is:

Lacey Creek Coal

	Feet	Inches
Massive sandstone	4	
Soft, bright, block coal		25
Light-gray, soft, clay shale	1	
Elevation	1008	

The Lacey Creek coal has been prospected by J. I. Gullett 350 yards further up the branch, at the right of the road, just as it takes the hill. The bed section is:

Lacey Creek Coal

	Feet	Inches
Massive sandstone	6	
Soft, bright, block coal		22
Light-gray, soft, clay floor		
Elevation	1004	

A combined section up this branch is as follows:

Section

	Feet
Top of hill on massive sandstone ....Elevation	1300
Massive sandstone	11
Bench	
Light-gray, sandy shales	39
Hamlin coal bloom ....Elevation	1250
Covered interval with hard, sandy shale float	40
Blue-gray, sandy shales	5
Thin coal bloom and bench of fire clay coal....Elevation	1205
Fine-grained, white, soft, sandstone	4
Hard, yellowish shales	6
Massive sandstone	20
Heavy coal bloom immediately over a massive sandstone.. Prominent bench also at this horizon ....Elevation	1175
Massive sandstone	20
Whitesburg coal bloom (lies over a massive sandstone) Elevation	1155
Massive sandstone	75
Shaly sandstone	5
Massive sandstone	25
Covered—probably shaly sandstone—place of Tom Cooper coal	22
Massive sandstone	21
Covered	3
Lacey Creek coal opening ....Elevation	1004

The top of the hill mentioned as the top of this section lies to the right of the point where the road to Litteral fork crosses the divide. The interval of the Lacey Creek coal to the Whitesburg coal is here ten or twelve feet too large. This is due to a south dip which especially affects the intervals near the base of the hill where the slope is gentlest, but probably does not affect the intervals of beds higher in the section.

Two miles up the State Road fork of Paint creek L. C. Bailey has a 20-foot entry into the Lacey Creek coal 300 yards up a right branch back of his house. The bed section is:

Lacey Creek Coal

	Feet	Inches
Shaly sandstone		
Light-brown shale	3	
Hard, black shale		7
Soft, bright, block coal		20½
Elevation	994	

One hundred and seventy yards below this opening in the bed of the same branch the Howard coal shows in natural exposure in the bed of the stream. The interval to the Lacey Creek coal is here 40 feet. The bed section is as follows:

Howard Coal

Massive sandstone	12
Soft, dark-gray shale	1½
Soft, bright, block coal	8½
Elevation	954

In a small left hollow 60 yards below the mouth of this branch, L. C. Bailey has a completely caved opening into the Lacey Creek coal at elevation 998. The roof only is partly exposed.

PANTHER LICK BRANCH

This is a large right branch three-fourths of a mile above the mouth of State Road fork.

At the mouth of the branch, on the left, a bed, coming 25 to 35 feet above the Wheelersburg coal, shows as a thin bed in natural exposure, at elevation 884 to 879. There is a pronounced dip down the branch.

At the upstream mouth of a small right hollow, 500 yards up the branch, Mr. Rice has an opening into the above-mentioned bed. The bed section is 9½ inches of block coal. The elevation of the opening is 894.

One thousand yards up the main branch both the Tom Cooper and Lacey Creek coals have been opened by Gardner Blanton. The opening into the Tom Cooper coal is 100 feet up a right hollow on the left and is completely caved. The coal was reported to be 2 feet thick and to have a black shale roof. The elevation of the opening is 995.

One hundred yards above this hollow, on the right bank of the main branch, Gardner Blanton has a 15-foot entry into the Lacey Creek coal with the following bed section:

Lacey Creek Coal

	Feet	*Inches*
Thin-bedded sandstone	2	
Soft, bright, block coal		21
Light-gray, clay shale		1
Soft, bright, block coal		11
Light-gray, clay shale		
Elevation	965	

One and one-eighth miles up the branch and 100 yards up a right branch, on a right drain, the Tom Cooper coal has been opened by Charley Helton. The bed section is:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, clay shale	5	
Dark-gray to black shale		16
Block coal		20
Elevation	995	

There are two immediately adjacent openings here.

One and a quarter mile up Panther Lick branch, on the right, are three adjacent 30-yard entries into the Lacey Creek coal. The bed section is:

Lacey Creek Coal

	Feet	*Inches*
Shaly sandstone	8	
Light-gray to white, thick-bedded shale	3½	
Block coal		27
Floor—light, shaly sandstone		6
Fine-grained, massive sandstone	1¾	
Elevation	985	

A strong dip shows in this opening of 12° to 15° N. 20° E. The roof is not good, being inclined to cave.

Two hundred and fifty yards above this point there is a badly caved prospect into the Lacey Creek coal. A partial section here is:

Lacey Creek Coal

	Feet	*Inches*
Light-gray, shaly sandstone	3	
Block coal		14½+
Elevation	967	

The roof is bad.

Two miles up the branch, at its head, Willard Blanton has a 20-foot entry into the Whitesburg coal 100 yards up a small left hollow back of his house (the last house on the branch). The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Soft, bright, block coal		3½
Light-gray, clay shale		1½
Soft, bright, block coal		3
Block coal with much hard, dull coal interlaminations		16
Elevation	1090	

Four hundred yards above this point the Whitesburg bed has again been opened by Willard Blanton in an 18-foot entry on the right of the road just as it takes the hill to State Road fork of Licking river. The bed section is:

Whitesburg Coal	Feet	Inches
Massive sandstone	3	
Dense, hard, black shale	2½	
Soft, bright block coal		4
Light, clay shale		¼
Block coal		12½
Elevation	1090	

The lower ten inches of the lower portion of this bed had much hard, dull coal.

ISAIAH FORK

This is a large right branch of Paint creek 750 yards above Panther Lick branch.

Four hundred and fifty yards up Isaiah fork, on the left, where the county line crosses the stream, the Lacey Creek coal shows in natural exposure. The bed section is as follows:

Lacey Creek Coal	Feet	Inches
Massive sandstone		
Block coal		11
Elevation	895	

A completely caved opening by Walter Stradler shows in a left branch, which is 900 yards up Isaiah fork. The opening is 400 yards up this branch on the right. The coal was the Whitesburg coal. The elevation of the bed is 1050. This coal was reported 2½ feet thick with 2 inches of slate in the middle of the coal.

The Lacey Creek coal shows in natural exposure as a thin bed under a massive sandstone ledge, 200 yards above the above-mentioned branch on the right of the stream.

The Lacey Creek coal shows 1 mile up Isaiah fork in a prospect by Green Adams on the left of the stream and 100 yards above his house. The bed section is:

Lacey Creek Coal	Feet	Inches
Massive sandstone		
Light-gray, sandy shale	3	
Block coal		21
Elevation	920	

A coal at the horizon of the Fire Clay Rider is opened by Mr. Picklesimer 400 yards up the left fork of Isaiah fork at the head of a left hollow in front of his house. The bed section is as follows:

Fire Clay Coal Rider

	Feet	*Inches*
Massive sandstone	7	
Light-gray, clay shale		10
Dark shale		6
Soft, bright, block coal		7
Light-gray, soft clay shale		8
Block coal with considerable hard, dull coal		28
Elevation	1092	

One thousand yards up this left fork of Isaiah fork, on the left, the Whitesburg coal has been opened in a 10-yard entry by Bernard Blair. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	3	
Black shale	4	
Block coal		7
Light-gray, clay shale		2
Coal with much hard, dull coal interlaminations		
Elevation	1043	

The following section was obtained on the road at the head of this fork:

Section

	Feet
Thin-bedded, shaly sandstone	28
Massive sandstone	17
Thin-bedded, shaly sandstone and sandy shale	45
Haddix coal bloom, with 1½ feet of black shale roof	
Elevation	1140

The Lacey Creek coal shows in natural exposure two hundred and fifty yards up Isaiah fork, above this left fork and opposite the mouth of the next branch. The bed section is:

Lacey Creek Coal

	Feet	*Inches*
Light-gray, clay shale	12	
Block coal		12
Elevation	933	

Seven hundred yards up a left branch which enters Isaiah fork opposite this coal exposure the Whitesburg coal has been prospected by Luther Litteral. The bed section is as follows:

Whitesburg Coal

	Feet	Inches
Black shale	4	
Soft, bright, block coal		7
Coal with much hard, dull coal interlaminated		20
Elevation	1065	

This section was obtained in a shallow prospect immediately adjoining an abandoned, wet, 40-foot entry into the same bed.

Four hundred yards up the same left branch, on the left, is an opening into the Whitesburg coal now completely caved. A partial section is:

Whitesburg Coal

	Feet	Inches
Light-gray, sandy shale	1½	
Black shale, less than		12
Coal		14+
Elevation	1070	

One mile and three-quarters up Isaiah fork, on the left, Manford Blanton has an opening into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Hard, black shale	5	
Soft, bright, block coal		7
Soft, light, gray clay shale		1
Block coal with many hard, dull streaks		14
Elevation	1075	

Four hundred yards above the mouth of Isaiah fork, on the left of Paint creek, the Lacey Creek coal is opened. The bed section is:

Lacey Creek Coal

	Feet
Massive sandstone	3
Block coal	2½
Elevation	895

A thousand yards above this opening on the left of Paint creek the Lacey Creek coal shows in natural exposure near stream level. The coal appeared to be less than 20 inches thick and was immediately under a massive sandstone ledge.

SAYLORS FORK

Within a hundred yards upstream of this exposure is the mouth of Saylors fork, a branch of Paint creek on the right. Three hundred yards up a right hollow one-half mile up Saylors fork is a 20-yard entry into the Whitesburg coal. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks in the base		
Hard, black shale	3½	
Soft, bright, block coal		6½
Light-gray, clay shale		2¼
Coal—much hard, dull coal		15½

LITTLE PAINT CREEK

Two and one-half miles above Oil Springs is a right branch of Paint creek known locally as Little Paint creek.

The Whitesburg coal is opened by Mr. Gibson 600 yards up this branch on the left. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Hard, black shale	4	
Soft, bright, block coal		5½
Light-gray, clay shale		1½
Soft, bright, block coal		24
Light-gray, clay shale		4
Coal with much hard, dull coal		14
Dark-gray, sandy shale	1	
Elevation	1000	

One-half mile up this branch above the mouth and just below his house Elisha Jackson has three adjoining entries into the Whitesburg coal. The bed section, in an 80-yard entry, is:

Whitesburg Coal

	Feet	*Inches*
Black shale		
Block coal		5½
Light-gray, clay shale		2½
Block coal		24
Light-gray, clay shale		8 to 9
Block coal		16
Medium-gray, clay shale floor		
Elevation	1004	

One hundred and fifty yards above this opening, on the opposite (right) side of the stream, the Whitesburg coal is again opened by Elisha Jackson in a 30-foot entry. The bed is here considerably thinner. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded at the base of the sandstone		
Hard, black shale	4½	
Soft, bright, block coal		14
Bituminous shale		½
Block coal with much hard, dull coal interlaminated		14
Medium-gray, clay shale floor		
Elevation	1007	

These two beds, although they have quite different bed sections, are undoubtedly the same bed.

In the upper opening the upper coal stratum is thicker—the first parting is thinner and the lower stratum of coal present in the lower openings probably lies beneath the floor.

There is a sharp break in the Whitesburg bed here of about 9 feet. From the lower opening the bed is seen to dip into the stream. Eighty feet below the upper opening the top of the bed was reported to have been found 8 feet below the level of the stream. Between this point and the upper opening a sharp break must come with upthrow on the upstream side.

A combined section on this branch is as follows:

Section

		Feet
Base of massive sandstone capping the highest hills in this immediate locality.		
Base at	Elevation	1300± est.
Covered interval, reported		15
Heavy coal bloom reported	Elevation	1285
Bench and reported coal bloom	Elevation	1261
Coal bloom under a massive sandstone (Whittaker coal)	Elevation	1240
Prominent bench and reported coal bloom	Elevation	1216
Covered interval		22
Lower break of prominent bench		
Covered interval		13
Young coal bloom	Elevation	1183
Covered interval		8
Lower break of bench		
Covered interval, massive sandstone in lower portion		55
Haddix coal: Massive sandstone 6′ Black shale 10″ Coal reported 24″	Elevation	1120
Fire clay rider coal bloom	Elevation	1070
Whitesburg coal opening	Elevation	1004
Covered interval 10+ feet shaly sandstone at base, massive sandstone above this shaly sandstone		32
Covered interval		3
Sandy shale		2
Top of massive sandstone ledge. Thickness unknown.		

LICKING RIVER

AND TRIBUTARIES ON THE LEFT FROM BURNING FORK TO PUNCHEON CREEK

The majority of the coal openings in this area are in coals lying between the Fire Clay coal and the Tom Cooper coal. The strata range from two to three hundred feet over the Flag coal to 40 feet below the Lacey Creek coal.

But few coal beds have been opened which show more than 3 feet in thickness and no coal bed has been definitely proved to hold a thickness of over 32 inches of coal over any considerable area.

The high coals—the Young, Hazard and Flag coals—may very possibly range from 36 to 45 inches over much of the area, but the lack of openings into these high coals prevents a positive statement that such is or is not the case.

The coal bed showing the greatest thickness of coal in this region is the Young coal in an opening at the head of Rocklick fork of Rockhouse fork. This bed has 41 inches of coal with 3 inches of parting. It is unlikely that this bed will be found to maintain this thickness as it appears to split up into thinner beds to the east and south of this locality.

The next thickest coal is the Fire Clay coal, which attains a thickness of 30 to 36 inches in portions of this region. Generally it is badly split into thin beds and is therefore valueless.

The Whitesburg coal is of workable or nearly workable thickness, varying from 26 to 34 inches throughout much of the upper portion of Burning fork and at the head of Middle creek. It is also workable at a number of places on Gun Creek.

The Gun Creek coal has over 30 inches of coal in places on the lower portion of Burning fork, but the roof is generally very poor and the bed badly parted. It is 24 to 30 inches thick on much of Mason fork and Gun creek and Puncheon creek, where it shows the greatest promise for commercial development.

The Tom Cooper coal, where seen, is very thin except in the upper portion of Burning fork and at the head of Middle fork. In this area it ranges from 22 to 28 inches of solid coal. So far as is known the Tom Cooper coal does not reach a thickness of more than 28 inches.

THE FLAG COAL

The bloom of the Flag coal has been observed 20 to 45 feet beneath the base of the sandstone cliff at the heads of the right branches of Rockhouse fork. The bloom of this coal is also seen near the head of Higgins branch. Nothing is known of the thickness of this bed in this region, but judging from its thickness in adjoining regions it is probably between 2 and 3 feet.

In a series of facings of coals made for the Kentucky Geological Survey by A. R. Crandall—Bull. 10, p. 29—a coal which is either the Flag coal or the Flag Coal Rider was faced up and showed a thickness of 26 inches. If the intervals are correct, as given, this coal is the Flag Coal Rider. These facings were made near the head of the Right fork of Middle creek, 2½ miles from the Magoffin county line at the Randolph Holbrook place in Johnson county.

The Flag coal is above the hilltops over most of the area and where the coal exists its area is too small for it to be a coal of economic importance.

THE HAZARD COAL

This coal has not been opened in this district. A heavy bloom of this bed is seen on Gun creek and was reported to be cannel coal. This bed also shows a heavy bloom on Big branch, near Ivyton. No measurements of the Hazard in this area could be obtained.

In a series of facings made for the Kentucky Geological Survey by A. R. Crandall and given in Bull. No. 10, p. 29, two coals at the horizon of the Hazard coal were faced up. The upper bed showed 20 inches of coal and the lower one 30 inches with 1½ inches of shale parting. The interval of the Hazard to the Flag coal is 30 to 50 feet and the interval to the Fire Clay coal varies from 215 to 250 feet. This coal will be of no economic importance because of the small area which it has in this region.

WHITTAKER COAL

The Whittaker coal has not been opened in this region and no measurement could be made of the bed. A decided bloom occurs at the horizon of this coal, in a section at the head of Big branch of Middle creek, near Ivyton. The bloom was dug into here and showed 2 feet thick without being faced for the entire thickness. In places this bed is apparently cut out by a massive sandstone. Because of its small area and lack of persistency and its height above drainage it will probably not be of any considerable economic importance. The interval of the Whittaker coal to the Hazard coal is 50 feet. The Whittaker coal is everywhere above drainage and where the hills rise to any considerable height the coal (or at least the horizon of the coal) will be found.

THE YOUNG COAL

The Young coal is the thickest coal which has been exposed so that measurement could be made in this area. Owing to the fact that it has only been found opened in one place nothing certain can be said of the variation in its bed section. As stated above, it has been opened by Ed Smith at the head of Rocklick fork of Rockhouse fork of Burning fork, where the bed section showed 41 inches of coal with 3 inches of parting. Wherever a section was made showing exposures at the horizon of the Young coal a bloom or a number of blooms representing splits of the coal showed at the stratigraphic position of this coal. It seems probable that the Young coal is at its best in the opening mentioned above, as there is evidence elsewhere of the bed being badly split. Although the Young coal will have rather small area in this region because of its height on the hills, it should be worth prospecting.

In the series of facings made at the Holbrook place the Young coal is 29 inches thick with an 18-inch sandstone parting.

The Young coal is about 35 feet under the Wet Branch coal and 150 to 165 feet over the Fire Clay coal.

On Rocklick fork of Rockhouse fork there is a massive ledge-forming sandstone of over 30 feet in thickness which comes over the Young coal.

TRACE FORK COAL

A thin but quite persistent bloom is found 100 feet over the Fire Clay coal and 20 feet over the place of the fossiliferous limestone. This coal correlates with the Trace Fork coal. The bloom of this bed appears thin, but the bed has not been found opened in this region. The interval from the Trace Fork coal to the Young coal usually consists of a massive sandstone.

FOSSILIFEROUS LIMESTONE

The fossiliferous limestone has been found in only one place in this area—on Higgins branch—and it is probably lacking throughout the southwest portion of the district. It appears to come in to the east, being reported in the Holbrook section on Middle creek as well as on Higgins branch. The fossiliferous limestone is 85 to 90 feet over the Fire Clay coal.

THE HADDIX COAL

In only one instance (the Holbrook section on Middle creek) has a coal bloom been found at the Haddix horizon in this area. This bloom is reported as thin and was apparently not faced.

Either the Haddix-Fire Clay interval has decreased to 45 to 50 feet and the Haddix coal corresponds with the coal to be mentioned below (the Hamlin) or else the Haddix is missing in this area. The latter supposition is thought to be the correct one and is strengthened by the thin bloom reported in the Holbrook section, which comes between the coal called Hamlin and the limestone.

THE HAMLIN COAL

A coal which is apparently not persistent, but which at times has a thickness of 22 to 28 inches, is found 40 to 50 feet over the Fire Clay coal.

On Rocklick branch of Rockhouse fork of Burning fork this coal is 12 inches thick with 3 inches of parting and has an interval to the Fire Clay coal of 36 feet. This coal was prospected at Judge Salyer's at the mouth of Salyer's branch. It was reported 24 to 30 inches thick, solid coal. The interval to the Fire Clay coal in that place was 40 feet.

The Hamlin coal was faced up at the Holbrook place on Middle creek, Johnson county, and showed a thickness of 20 inches of coal with 36 inches of parting. On Puncheon creek this coal is reported 18 to 25 inches thick and 35 to 40 feet over the Fire Clay coal.

The Hamlin coal is distinguished from the Fire Clay Rider by coming over rather than under the massive sandstone which lies over the Fire Clay coal and by having a 35+ foot Fire Clay interval instead of a 25-foot interval, as is the case with the Fire Clay Rider. This coal will be found everywhere above drainage in this region and will have fairly good area, but so far as is known will be too thin to be a commercially valuable coal. Its maximum thickness is 28 inches and it will probably not average over 24 inches thick over any considerable area.

THE FIRE CLAY RIDER

This coal is distinguished from the overlying Hamlin coal by having a smaller Fire Clay interval and by occurring under the massive sandstone which overlies the Fire Clay coal. It is not a persistent coal in this region, but appears to be cut out by the massive sandstone which commonly overlies the Fire Clay coal.

The maximum thickness of this bed is probably about 26 inches and it will not average over 20 inches. This is the 22-inch coal of the Holbrook section. On account of its thinness the Fire Clay Rider will probably not prove of interest from the economic standpoint. So far as is known it is best developed in the eastern portion of the area below Ivyton, on Middle creek, on Higgins branch, on the small branch entering Licking river adjoining Higgins branch and on Gun creek. When present it is 12 to 20 feet over the Fire Clay coal, and the interval to the latter coal consists of soft, light-gray shale sometimes with small ferruginous concretions.

THE FIRE CLAY COAL

The Fire Clay coal in this region is everywhere above drainage and everywhere under the hills where they are of any height, but is at its best in the western portion of this territory, where it will average 32 inches. In the eastern portion of this region the bed splits up on the upper portion of Burning fork, about Ivyton, on the head of Middle creek and in the upper part of Gun creek. It is not badly split on Rockhouse fork of Burning fork and will probably be found to have 22 to 30 inches of coal there.

The Fire Clay coal ranges from 26 to 37 inches in thickness with the flint fire clay, ranging from 2 to 5 inches, the only parting, over Burning fork until about 2½ miles above Bradley; also on Rockhouse fork of Burning fork. The coal is of this thickness also on Mason fork and on the branches of Licking river from the mouth of Mason fork to the mouth, this bed becomes badly split.

The coal is thin and split, though possibly workable at times, on the left branches of Licking river from the mouth of Gun Creek to the mouth of Puncheon creek.

The flint fire-clay parting, typical of this bed, is well developed in the bed in the western part of the area, but becomes thin and loses its distinguishing characteristics toward the east.

This bed has in almost all cases a massive sandstone 20 to 40 feet thick within 10 feet over the bed. Frequently this sandstone lies directly over the coal.

LOCAL COAL

On Burning fork near Bradley and in the adjoining portion of Rockhouse fork a coal is found which appears to come 18 to 24 feet over the Whitesburg coal and under a massive sandstone 20+ feet thick. It is a thin coal with a maximum thickness of 22 inches, which it shows on a small left branch of Rockhouse fork of Burning fork.

A thin 8-inch coal is found at this horizon on Oakley creek, but elsewhere no coal has been found occupying the position of this bed.

THE WHITESBURG COAL

The Whitesburg coal is everywhere above drainage in this region and everywhere has good area. Throughout most of the area, however, it is too thin (less than 20 inches thick) to be a workable coal. This bed is frequently opened on Rockhouse fork of Burning fork and on Burning fork above the mouth of Rockhouse fork as far as and beyond the Johnson county line. It ranges about workable thickness throughout the above-mentioned region and also in the upper portion of Gun Creek.

The maximum thickness of the Whitesburg coal is 34 inches and its minimum thickness 25 inches in this area. The bed is usually unparted, though there is sometimes a small shale parting, as much as 2 to 3 inches thick, two-thirds of the way up in the bed. The upper one-third of the bed is usually a bright, soft, block coal, and the lower portion is characterized by having much hard, dull coal interlaminated with the above-mentioned bright coal.

The bed can usually be recognized by its thick black shale roof, which is rarely less than 1 foot thick and is usually over 2 feet thick. The shale is a hard, black, fissile shale closely approaching a black slate. In this area this black shale is nearly always overlain by a massive sandstone of over 15 feet in thickness.

The 30 inches of coal of the Holbrook section is the Whitesburg coal.

The Fire Clay-Whitesburg interval is high in this area, averaging about 50 feet or even higher locally. When this interval is greater than 50 feet the Fire Clay bed is split, and the measurement was made to the one of the split beds which carries the flint fire-clay parting.

THE GUN CREEK COAL

The Gun Creek coal has a maximum thickness of 36 inches in this region, but this is an unusual thickness for this bed, as over nearly all this area it is too thin or too much parted to be of value.

In that portion of this region where the Whitesburg coal has its poorest thickness the Gun Creek coal has its best and vice versa.

The Gun Creek coal has been frequently opened in the lower portion of Burning fork on the Licking River road between Burning fork and Mason fork, and on Gun creek and on the river between the mouth of Gun creek and the mouth of Higgins branch.

The Gun Creek coal on Burning fork has a maximum thickness near the mouth of Burning fork of 26-inch coal with 10 inches of parting. The thickness of this bed decreases going up Burning fork to 11 inches of coal near the mouth of Rockhouse fork of Burning fork.

In the upper part of Burning fork the Gun Creek coal is too thin to be of any economic value. The thin coal, 80 feet above the stream in the Holbrook section, is at the horizon of this coal.

On Mason fork the Gun Creek coal is too badly parted to be of any value. A typical section would be 25 inches of coal with 17 inches of parting.

The Gun Creek coal is at its best on Gun creek and just above Gun creek on the river. It has been frequently opened on Gun creek, showing 23 to 33 inches of coal with 3 to 5 inches of shale just about in the middle of the bed. The average bed section on Gun creek would probably be 27 inches of coal with 4 inches of parting.

This coal has been dug from the bed of Licking river just below the mouth of Higgins branch, where it showed a thickness of 36½ inches with some parting. It goes under drainage at this point.

The roof of the Gun Creek coal is very poor on Burning fork and Mason fork, being a soft, light-gray shale which has a strong tendency to cave. The roof is slightly better on Gun creek, but could hardly be called good there.

It has very good area throughout this region, being everywhere above drainage except from the mouth of Higgins branch up, where it is below river level.

The Gun Creek-Whitesburg interval is 55 to 63 feet, being largely shaly sandstone. Some of these shales are highly calcareous and often carry calcareous concretions.

On the bank of Licking river, just above the mouth of Higgins branch, large, impure, calcareous concretions, disc shaped with diameters as large as 4 to 5 inches, occur. There are numerous septaria markings in these concretions.

On Gun creek small calcareous concretions carrying small amounts of galena and sphalerite are found in this interval.

LOCAL COAL (IVYTON COAL)

On Burning fork, in the vicinity of Bradley, a coal has been opened which comes 30 feet below the Gun Creek coal and between it and the Tom Cooper coal. It ranges from 12 to 20 inches in thickness with as much as 2-inch parting. This coal has been found again at Ivyton, where it is less than 4 inches in thickness immediately under a massive sandstone and 33 feet above the Tom Cooper coal. It is of no economic value.

TOM COOPER COAL

The Tom Cooper-Whitesburg interval has increased from 95 to 100 feet in the State Road Fork region to 125 to 130 feet on Burning fork near Ivyton. This coal is below drainage over much of the area, being found above drainage only where low coals are brought up by the rise up Burning fork and along Licking river between Burning fork and Mason fork, where it is about 14 inches thick and near river level.

The thickness of this coal, in the region at the head of Burning fork where it is above drainage, ranges from 18 to 26 inches. The bed is free from partings and has a dark shale roof. The soft-gray shales with concretions which are so often found overlying the Tom Cooper coal are very well developed in this region, being 20 to 30 feet thick.

The Tom Cooper bed is the 15-inch coal of the Holbrook section.

LACEY CREEK COAL

The Lacey Creek coal is above drainage only at the head of Middle creek between Ivyton and the county line. This coal is of no economic importance in this area; it runs from 16 to 19 inches in thickness with a shaly sandstone roof. The interval to the Tom Cooper coal is 35 to 40 feet.

BURNING FORK

Five hundred yards up Burning fork, on the left, Kelly Larkins has a 15-yard, wet entry into the Gun Creek bed. The bed section is:

Gun Creek Coal

	Feet	Inches
Light-gray, clay shale		
Block coal		8
Bituminous, gray, clay shale		1½
Block coal with much hard, dull coal		8½
Light-gray, clay shale		10
Block and splint coal		7½
Elevation	895	

The roof of this bed is very poor and tends to cave.

Two hundred yards further up Burning fork, on the left, the Fire Clay coal has been opened on the land of Miss Doris Willis, at elevation 1006. The opening is now completely caved. Flint fire-clay float was found in the dump.

The Fire Clay coal has been opened in a 15-yard entry by George E. Moore one-half mile up Burning fork on the left. The bed section is as follows:

Fire Clay Coal

	Feet	Inches
Light-gray, clay shale	3	
Blue-gray, clay shale	1	
Coal		½
Light-gray, clay shale		¾
Coal		¾
Light-gray, clay shale		1
Coal		1
Hard, black shale		4
Cannel slate		3½
Bituminous shale		4
Splint coal		7½
Thin pyrite seam, average		¾
Soft, light-gray, clay shale		1
Elevation	1005	

The bottom of this bed was not reached, probably about 5 inches of the bed being concealed in mud and water. The flint fire-clay parting probably lies in this concealed part of the bed.

At the base of the hill below this opening is a completely caved opening into the Gun Creek coal at elevation 900. This gives a Fire Clay-Gun Creek interval at this point of 105 feet.

Seven-eighths mile up Burning fork, at the mouth of a small left branch, on the left, W. H. Blankenship has a completely caved opening into the Gun Creek coal at elevation 900.

One mile up Burning fork a thin coal bed, apparently 6 inches thick, shows by the side of the road overlain by hard, sandy shale. This is a bed 30 feet below the Gun Creek coal and correlates with the thin coal at Ivyton.

Seventy-five yards further up Burning fork and 100 yards up a left hollow, on the left, is a completely caved opening into the Gun Creek coal at elevation 902.

At the upstream mouth of this gully the following partial section of a bed at the Gun Creek horizon shows:

Gun Creek Coal

	Feet	Inches
Sandy shale		
Coal bloom		4
Shale		¾
Cannel slate		2
Light-gray, clay shale		16
Coal		7+
Elevation	907	

One mile and a quarter up Burning fork, on a right branch 200 yards above the house and on the right, the Gun Creek coal has been opened by John Salyers. The opening is now completely caved at elevation 910.

The Fire Clay coal is opened by John Salyers, 200 yards below the head of the right fork of this branch, on the right. The bed section is:

Fire Clay Coal

	Feet	Inches
Thin-bedded sandstone		
Block coal		7½
Hard, light-gray, clay shale		13
Block and splint coal, interlaminated		8
Flint fire clay		2½
Coal, largely hard, dull coal		13
Light-gray clay shale floor		
Elevation	1005	

Immediately adjoining this prospect is a completely caved opening into the same bed.

Two hundred and fifty yards up Burning fork above the mouth of the above-mentioned branch is another right branch. One-eighth of a mile up this branch, on the left, just below the first right-hand house, there is a prospect by Clay Willis into the coal which comes 30 feet below the Gun Creek coal. The bed section is:

Ivyton Coal	*Feet*	*Inches*
Massive sandstone	4	
Block coal		6½
Bituminous clay slate		2
Block coal		13½
Light-gray, clay, shale floor		
Elevation	902	

Two hundred and fifty feet above this prospect, on the same side, the same bed is opened by the same owner. The bed section is:

Ivyton Coal	*Feet*	*Inches*
Light-gray, shaly sandstone	4	
Block coal		6½
Light-gray, clay shale		2
Block coal		9

Seventy-five yards further up on the same side the same bed has been opened again.

Three hundred yards up the first right branch on this branch, on the left, a prospect by Clay Willis into the Fire Clay coal gives the following partial section:

Fire Clay Coal	*Feet*	*Inches*
Thin-bedded sandstone		
Block coal		5
Flint fire clay		1½
Block coal		12½
Cannel slate		
Elevation	1030	

This bed was reported 3 feet thick.

One and one-half miles up Burning fork and up the second left branch above the above-mentioned branch the Gun Creek coal has been opened by Wal Preston. The opening, one-eighth mile up the branch on the right, gives the following bed section:

Gun Creek Coal	*Feet*	*Inches*
Light-gray, thin-bedded sandstone	3	
Splint coal		6½
Bone coal		2½
Splint coal		7
Light-gray, soft clay shale		7
Splint coal		3
Impure coal, shale and coal mixed		3½
Coal with much hard, dull coal		7
Elevation	920	

Within a distance of 250 feet of this opening are three openings, all into the same bed, with the same bed section.

One hundred and twenty-five yards up on the left side Dona Patrick has a 9-foot caved prospect into the same bed. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	6	
Block coal		8
Bituminous clay shale		2½
Block coal		4½
Light-gray, clay shale		16½
Splint coal		3
Light-gray clay shale floor		
Elevation	918	

Two hundred and fifty yards up this same branch on the right Wal Preston has another entry into the Gun Creek coal. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone		
Splint coal		7
Light-gray bituminous clay		2½
Coal, largely splint		6½
Soft, light-gray clay shale		4¼
Block coal		3
Light-gray clay shale		1½
Block coal, largely hard, dull coal		7½
Light-gray clay shale floor		
Elevation	919	

Two miles up Burning fork, 70 yards up a left branch, on the right, the Ivyton coal is opened. A shallow prospect by T. J. Prater gives the following bed section:

Ivyton Coal

	Feet	*Inches*
Massive sandstone	15	
Block coal		5
Light-gray bituminous clay		2½
Block and splint coal mixed		9
Gray, hard shale		1
Impure coal		4
Gray clay shale floor		
Elevation	884	

There is considerable pyrite in this coal.

One-half mile below Bradley, on the left of Burning fork, George E. Moore has three adjacent completely caved openings into the Gun Creek coal. The elevation is 915.

Five hundred and fifty yards up Burning fork at the upstream mouth of a left branch a coal bed shows in a ditch by the side of the road. The bed section is:

Ivyton Coal

	Feet	Inches
Black shale		6
Block coal		11
Bituminous shale		1
Block coal		3
Black shale floor		
Elevation	900	

Below this bed the following section shows:

	Feet
Light-gray, clay shale	6
Massive sandstone	10

There is a dip here (probably local) of ½° in a direction S. 60° E.

ROCKHOUSE FORK OF BURNING FORK

The stream forks at Bradley and the left fork is known as Rockhouse fork.

The Gun Creek coal is opened in a 10-foot entry by John Bailey, 200 yards up a left branch, 600 yards up on Rockhouse fork. The bed section is:

Gun Creek Coal

	Feet	Inches
Massive sandstone	5	
Block coal		6½
Soft, light-gray clay shale		1½
Block coal		3¾
Soft, light-gray clay shale		¼
Block coal		6½
Gray shale floor		
Elevation	933	

SHORT FORK

Short fork is a right branch of Rockhouse fork three-fourths mile above Bradley.

Six hundred and fifty yards up Short fork, on the right bank of the stream near stream level, John Salyer has a 4-foot prospect into the Gun Creek coal. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Hard, sandy shale	3	
Block coal		7½
Medium gray, soft clay shale		8
Block coal		6½
Light-gray clay shale		1½
Block coal		4
Elevation	886	

One hundred yards downstream the same bed is opened in a shallow prospect at the same elevation and showing the same bed section.

The Gun Creek coal is again opened by John Cain one-half mile up Short fork, on the left, at the upstream mouth of a small left hollow. The bed section is as follows:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	5	
Block coal		7
Light-gray clay shale		8
Block coal		4½—6½
Light-gray clay shale		1½
Block coal		3
Black shale floor		
Elevation	896	

The bloom of the Gun Creek coal shows, 7½ feet thick, 100 yards up a small left branch, three-fourths mile up Short fork. The roof is light-gray clay shale.

The Whitesburg coal is opened one-third mile up this branch on the right-hand side. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	10	
Light-gray, soft clay shale	2½	
Hard black shale	1½	
Block and splint coal		3½—5½
Block coal with much hard, dull coal		16—17
Elevation	960	

The Whitesburg coal is opened by Sam Hapworth one-half mile up a right branch which is 1 mile up Short fork. The bed section is:

Whitesburg Coal	Feet	Inches
Massive sandstone	3	
Hard, black shale		22
Block coal		5½
Soft, light-gray shale		⅛
Block coal		4
Block coal with much hard, dull coal		13
Elevation	1004	

The Whitesburg coal is opened 300 yards up a left branch, 1¼ miles up Short fork, on the right of this branch. The opening is a 25-yard entry by H. H. May. The bed section is:

Whitesburg Coal	Feet	Inches
Hard, black shale		44+
Splint coal		11
Block coal with much hard, dull coal		16
Elevation	975	

The Whitesburg coal has been opened in a 15-yard entry by Will Adams, 1½ miles up Short fork, on the right, 150 yards above a right trail to Kelly branch of Burning fork. The bed section is:

Whitesburg Coal	Feet	Inches
Massive sandstone	2	
Block coal		5
Light-gray clay shale		1
Block coal		5½
Block coal with much hard, dull coal		19
Elevation	1015	

Within 60 feet upstream of this bed there are two shallow openings into the same bed.

Three hundred yards above this opening in a small right hollow the Whitesburg coal has been opened by George Clinton Salyer, opposite the first house below the school house on Short fork. The bed section is:

Whitesburg Coal	Feet	Inches
Massive sandstone		2+
Block coal		5½
Light-gray soft shale		½
Block coal		3
Block coal, largely hard, dull coal		16½
Gray shale floor		
Elevation	1020	

One hundred and fifty yards above the school house and 2 miles up Short fork, on the left, John Henry Adams has an opening into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in its base	10	
Hard blask shale		4
Block coal		6
Hard sandy shale		½
Block coal with much hard, dull coal		14
Elevation	1015	

The following section was obtained on the trail to Big branch of Middle fork at the head of this branch:

Section

		Feet
Base of High Rock sandstone	Elevation	1350
Covered interval		90
Thin bed of very ferruginous sandstone		
Covered interval		25
Young coal bloom	Elevation	1235
Massive sandstone		45
Trace Fork coal bloom	Elevation	1190
Covered interval		25
Heavy coal bloom	Elevation	1165
Covered interval		17
Massive sandstone		33
Covered interval		3
Coal bloom near Fire Clay coal horizon 5+ inches thick	Elevation	1112
Covered interval		52
Coal reported to have been raised from stream. Probably the Whitesburg coal	Elevation	1050

ROCKHOUSE FORK ABOVE SHORT FORK

Two hundred yards up a small left branch, just above the first left house on Rockhouse fork, the Gun Creek coal has been prospected by Wilson Risner. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	7	
Dark-gray to black, hard slaty shale		3
Block and splint coal mixed		9
Soft, light-gray clay shale		2¾
Block coal		3
Medium gray, soft clay shale		
Elevation	928	

One hundred and fifty yards up this branch, on the same side, a 12-foot entry into the Gun Creek coal by Elbert Risner gives:

Gun Creek Coal

	Feet	Inches
Massive sandstone	6½	
Dark-gray to black, hard, slaty shale		3
Block and splint coal mixed		8½
Soft, light-gray clay shale		1½
Block and splint coal mixed		5
Shale floor		
Elevation	970	

There is a dip down this branch of 40 feet in less than one-fourth mile.

Below this bed is 10+ feet of soft gray shales with calcareous concretions.

Coal has been raised from a coal bed 18 feet below the above-mentioned bed with a black shale roof.

The Gun Creek coal has been opened by Green Adams, 100 yards up a left branch, just below his house, on the right of this branch. The mouth of this branch is three-fourths mile up Rockhouse fork. The bed section here is:

Gun Creek Coal

	Feet	Inches
Massive sandstone	4	
Block coal		7
Dark-gray shale		3½
Block coal		3½
Soft, light-gray shale		
Elevation	898	

The Gun Creek coal has been opened again 250 yards above the last opening on the right of the branch in a 12-foot entry by Tom McCormick. The bed section is:

Gun Creek Coal

	Feet	Inches
Massive sandstone	7	
Hard black shale		8
Splint coal		7
Light-gray clay shale		¼
Block coal		12¾
Dark-gray shale		
Elevation	923	

A coal 15 to 20 feet over the Whitesburg coal has been opened directly across from the above-mentioned opening, at the head of a left drain. A 4-foot prospect by Tom McCormick here shows the following section:

Section	Feet	Inches
Massive sandstone with coal streaks cross bedded in the base	6	
Hard gray shale		8
Block coal		8½
Light-gray clay shale		¼
Block coal		2½
Block coal with much hard, dull coal		7½
Dull fibrous coal with much natural charcoal		1
Block coal		2½
Bituminous shale floor		
Elevation	993	

This bed is to be correlated with the coal opened on Burning fork at elevation 1050.

Section on trail going to Mash fork up the head of this branch:

Section		Feet
Base of massive sandstone under Hazard coal	Elevation	1250
Covered interval		135
Thin coal bloom and bench (Haddix)	Elevation	1115
Massive sandstone		35
Hamlin coal bloom	Elevation	1080
Light-gray sandy shales		30
Massive sandstone		7
Fire Clay coal bloom	Elevation	1043
Massive sandstone		36
Covered interval		47
(The coal opened at 997 lower down on branch probably comes in this interval)		
Coal bloom	Elevation	946
Soft, gray shale		2
Covered interval		21
Opening into the Gun Creek coal	Elevation	923

There is a strong dip down this branch; it is possible therefore that the coal bloom at elevation 946 at the base of the section is the Gun Creek coal, which falls to elevation 923, one-third mile down the branch.

The Whitesburg coal is opened in a 12 foot entry by Leander Patrick, 300 yards up a small right branch on the left of the mouth and three-fourths mile up Rockhouse fork. The bed section is:

Whitesburg Coal	Feet	Inches
Massive sandstone	7	
Block coal		8
Soft, light-gray clay shale		½
Block coal		2
Block coal with much hard, dull coal		10½
Light-gray clay shale floor		
Elevation	955	

The Gun Creek coal, at stream level here, rises up Rockhouse fork, at about the rate of rise of the stream, to the mouth of Rocklick fork.

ROCKLICK FORK

Rocklick fork is a right fork of Rockhouse fork entering Rockhouse fork 1½ miles above the mouth of Short fork. The Whitesburg coal is opened in a 15-yard entry by Knock Bailey one-fourth mile up Rocklick fork on the left. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in the base	4	
Hard, black shale		13
Splint coal		12
Block coal with much hard, dull coal		12
Cannel or semi-cannel coal		3
Elevation	940	

Within 100 yards upstream of this opening there are 4 openings into the same bed. The openings are 10-yard entries and give practically the same bed section as the above-mentioned entry. The bed section of the last of these openings, owned by Henry Adams, is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	6	
Gray shale with sandstone in the upper 10 inches		24
Splint coal		12
Block coal with much hard, dull coal		10
Cannel coal		3
Black bituminous shale floor		
Elevation	935	

The Whitesburg coal goes under drainage, three-fourths mile up Rocklick branch, at elevation 945.

Coal is raised from the Fire Clay bed three-fourths mile up Rocklick branch and 150 yards below the first of the two left houses, near the head of the stream. A partial section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	3	
Gray clay shales	4	
Block coal		16
Light-gray, soft shale		7
Block coal		2
Soft, light-gray shale		1
Flint fire clay		2
Impure boney coal		1
Block coal		13+
Elevation	997	

The bottom was not certainly reached, as the lower part of the section given above was below stream level. It is not thought that there is more than 3 inches of probable coal below the 13 inches of coal at the base of this section.

The following section was made from this point up the road leading from Rocklick fork to Big branch of Middle creek:

Section

			Feet
Base of the Puncheon Creek sandstone.........Elevation			1340
Covered interval			134
Top of massive sandstone.........Elevation			1206
Covered interval with massive ledge-forming sandstone 40 feet thick in the upper portion			66
Young coal opening	Hard clay shale	5′	Ele. 1140
	Block coal	10½″	
	Medium gray shale	1½—2″	
	Block coal	15½″	
	Hard gray shale	½″	
	Block coal with much hard, dull coal	15″	

(The location of this opening is halfway up the hill on the right of the road. This opening is a 10-foot prospect by Ed Smith.)

Covered interval			13
Covered interval with a thin bed of massive sandstone in the upper portion			17
Trace Fork coal	Coal	2½"	Elevation 1110
	Shale	3"	
	Coal	½"	
	Shale	3"	
	Coal	3"	
Covered interval			47
Massive sandstone			19
Covered interval			16
Massive sandstone			28
Fire Clay coal (for section see preceding page) Elevation			997

The Hamlin coal has been opened by Frank Porter, 250 yards up Rocklick fork above the point where the trail to Big branch of Middle creek turns off and ascends the divide, in a 4-foot prospect on the right bank of the stream. The bed section is:

Hamlin Coal

	Feet	*Inches*
Massive sandstone	3	
Dark-gray to black, soft shale	2	
Block coal		2½
Medium gray shale		2½
Block coal		4½
Soft gray shale		½
Block coal		5
Light-gray clay shale floor		
Elevation	1034	

Four hundred yards up Rockhouse fork above the mouth of Rocklick fork, Orlando Blanton has two openings into the Whitesburg coal on opposite sides of a small right gully.

The opening on the right-hand side is completely caved. The opening on the left, a 25-foot entry, gives the following bed section:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in the base	8	
Soft, bright block coal		10½
Block coal, largely hard, dull coal		15
Soft, gray clay shale		
Elevation	950	

Seventy yards upstream, 100 feet below the first right house, on the left bank, a split coal shows at the Gun Creek horizon. The bed section is:

Gun Creek Coal

	Feet	Inches
Light-gray, hard shale	4½	
Dark shale with streaks of coal		18
Elevation	901	

About 100 feet up the stream, in the stream bed, the Gun Creek coal shows in natural exposure as follows:

Gun Creek Coal

	Feet	Inches
Dark shale with coal streaks		
Light-gray, hard clay shale	7½	
Block coal		5½
Gray shale		3
Block coal		1½
Elevation	899	

Six hundred yards up the fork, on the right bank, 5 feet above stream level, the Gun Creek coal shows in natural exposure at elevation 904. The bed here shows 7½ inches coal under 17 inches of soft black shale. There is a decided upstream rise on this fork.

The Whitesburg coal has been opened in a 30-foot entry by Mr. Coldiron, one-half mile up Rockhouse fork and 70 yards up a small right gully, on the left of the gully. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	5	
Hard black shale	2	
Soft, bright block coal		8½
Block coal, largely hard dull coal		16
Elevation	958	

BEARTREE BRANCH OF ROCKHOUSE FORK

Beartree branch enters Rockhouse fork on the right, about 1 mile above the mouth of Rocklick fork. At the mouth of Beartree branch the Gun Creek coal gives the following section:

Gun Creek Coal

	Feet	Inches
Thin-bedded shaly sandstone and sandy shales...	8	
Massive sandstone	3	
Greenish-gray sandy shales	18	
Black shale with thin coal seams		
Block coal		7½
Elevation	917	

Two hundred and twenty yards up Beartree branch, on the left, the following section of the Gun Creek coal was obtained:

Gun Creek Coal

	Feet	Inches
Massive sandstone	2½	
Light-gray clay shale		6
Sandy shale		9
Soft, gray shale	1¼	
Hard black shale		8
Block coal		7
Elevation	919	

There is a change in the roof of this bed from a shaly sandstone to a massive sandstone within a distance of 200 yards.

Six hundred yards up Beartree branch, on the left, the Whitesburg coal shows in natural exposure on the left bank of the stream. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	6	
Block coal	4	8
Sandy shale	4½	
Block coal		9½
Light-gray shale floor		
Elevation	971	

This bed varies much in thickness in a short distance, the upper bed especially having a very uneven upper surface.

One mile up Beartree branch, 600 yards up a left branch, on the right, Bill Litteral has an opening into the

Whitesburg coal, 70 yards below the first house on this branch. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	10	
Hard black shale		4
Block coal		6½
Light-gray sandy shale		½
Soft, bright block coal		1
Block coal, largely hard, dull coal		6½
Elevation	1020	

There is a strong dip down this branch.

One and one-third miles up Beartree branch the stream forks. The Whitesburg coal shows in natural exposure near stream level, 320 yards up the left fork. The bed could not be measured.

Six hundred yards up this branch, in the yard of a house on the left, the bloom of the Fire Clay coal shows at elevation 1053.

Mica was reported to have been found at the head of this branch in large blocks, 4 to 6 inches across, but none could be seen, although a careful search was made for it.

RIGHT FORK OF BEARTREE BRANCH

Eighty yards up the right fork of this branch is a prospect at stream level into the Whitesburg coal by Taylor Pace. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone with coal streaks cross-bedded in the base	6	
Hard black shale		9
Soft, bright block coal		6½
Light-gray, soft shale		1½
Block coal, largely hard, dull coal		11½
Soft, gray shale		
Elevation	1000	

The Fire Clay coal has been opened by Taylor Pace 280 yards up this fork on the left. A partial section is:

Fire Clay Coal

	Feet	Inches
Light-yellowish sandy shales		
Hard sandstone, somewhat shaly	8	
Coal		19½+
Elevation	1032	

The bottom of this bed was not reached. Pieces of flint fire clay were found on the dump. This bed was reported to be 3 feet and 3 inches thick with the flint fire-clay parting 6 inches from the base of the bed and a "few inches" of slate about 1 foot from the bottom of the bed.

Five hundred and fifty yards up a small right hollow the following section was obtained:

Section

	Feet
Coal bloom .... Elevation	1163
Covered interval	10
Massive sandstone, shaly at top	40
Covered interval	10
Shaly sandstone	10
Soft, gray shale	2
Massive sandstone with thin coal streaks cross-bedded in the base	8
Base of sandstone elevation	1083
Covered interval	2
Shaly sandstone with large calcareous concretions......	8
Massive sandstone	20
Covered interval	16
Fire Clay coal bloom .... Elevation	1036

Six hundred yards up this fork at stream level, a bed of coal of greater thickness than 8 inches has been dug into. The coal has a massive sandstone roof and is at elevation 1038. This is the Fire Clay coal bed, which has risen slightly upstream.

The following section was made up a trail leading from Beartree branch to Big branch of Middle creek. The base of the trail is opposite Taylor Pace's house:

Section

	Feet
Base of the High Rock sandstone cliff......... Elevation	1325
Covered interval	20
Flag coal bloom .... Elevation	1305
Covered interval	12
Interval, largely covered, chiefly massive sandstone.....	105
Massive sandstone	20
Young coal bloom .... Elevation	1168
Massive sandstone	40
The coal immediately under massive sandstone (Trace Fork coal) .... Elevation	1128
Covered interval, largely shaly sandstone, becoming more massive at the top	75
Bottom clay (Fire Clay rider) .... Elevation	1053

One hundred and fifty yards above the house, on the right of the left branch of this fork, in a drain, the Haddix coal shows in natural exposure on the land of Taylor Pace:

Haddix Coal.

	Feet	Inches
Shaly sandstone	10	
Massive sandstone	6	
Sandy shales	15	
Cannel coal		2½
Stone coal		10½
Elevation	1088	

It is possible that this coal is the Hamlin coal, but unless there is a strong upstream rise the interval to the Fire Clay coal is too great for this bed to be the Hamlin.

The Gun Creek coal shows in natural exposure 150 yards above Beartree branch, up Rockhouse fork, on the left of the stream:

Gun Creek Coal

	Feet	Inches
Gray clay shale		
Block coal		14
Elevation	935	

Two hundred yards further up the stream the same bed gives the following bed section:

Gun Creek Coal

	Feet	Inches
Gray shale		
Block coal		23½
Elevation	945	

Six hundred yards upstream, on the right bank of the stream, the Gun Creek coal has been opened in a 20-foot entry. The bed section here is:

Gun Creek Coal

	Feet	Inches
Massive sandstone	4	
Soft, bright block coal		9½
Natural charcoal		½
Block coal		6½
Elevation	950	

This is a dip of 6° S. 85° E. here.

Three-fourths of a mile up Rockhouse fork, 300 yards up a small left branch, on the right of the branch, Lon

Scott has a 35-foot entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Hard black shale	3½	
Block coal		30
Light-gray, clay shale floor		
Elevation	1030	

This bed dips 4° S. 75° E.

One mile up Rockhouse fork, on the right, the Whitesburg coal has been prospected. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	7	
Hard black shale		4½
Soft, bright block coal		8
Block coal with much hard, dull coal		12½
Soft, gray clay shale floor		
Elevation	1000	

The Gun Creek coal shows in natural exposure 150 yards above this opening in the bed of the stream. The section is:

Gun Creek Coal

	Feet	Inches
Gray, sandy shale	3	
Coal, largely cannel		6½
Sandy shale		7
Coal		1½
Elevation	975	

One and one-fourth miles up Rockhouse fork the Whitesburg coal has been opened, on the right, by John Perkins. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	12	
Black shale	1½	
Soft, bright block coal		8
Block coal with much hard, dull coal		14½
Elevation	1040	

Seventy yards upstream is another opening into the same bed.

The Fire Clay coal is opened by Jim Williams 1¾ miles up Rockhouse fork at the left mouth of a branch just below his house. The opening was just started at the time of visit and a bed section could not be obtained. A partial section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Block coal		3
Light-gray, clay shale	3	
Block coal		6+
Elevation	1090	

One hundred and fifty yards up this branch, on the right, is an opening, also by Jim Williams, perceptibly lower than the last. A partial section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone		
Light-gray, clay shale	5	
Block coal		7
Light-gray, sandy shale		2½
Block coal		14+
Elevation	1085±	

Opening not driven into solid roof or solid coal. No flint fire clay was found in either of these beds, nor was it found in the dumps, but it may possibly be in the lower portion of the bed, which was not exposed or may be entirely lacking.

The following section was obtained on the road going from the head of Rockhouse fork to Salyers fork of Little Paint creek. The section is on the Licking river side of the divide:

Section

		Feet
Top of trail	Elevation	1180
Covered interval		27
Haddix coal bloom	Elevation	1153
Massive sandstone		13
Covered interval		5
Hamlin coal bloom	Elevation	1135
Covered interval		45
Fire Clay coal opening	Elevation	1090
Covered interval		15

Coal has been dug from the Tom Cooper bed on the first right branch on Burning fork above the mouth of Rockhouse fork, and one-fifth of a mile up the branch on the land of Elliott Howard. The opening was completely caved when visited. The roof showed 1+ foot dark-gray shale. Elevation, 893.

Three-fourths of a mile up Burning fork, above the mouth of Rockhouse fork, one-third mile up a left branch, the Gun Creek coal has been opened in a 20-foot entry by W. E. Patrick on the right of the branch. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	3	
Light-gray, clay shale	2	
Hard, dark shale	1	
Soft, bright block coal		13½
Hard, dull coal		9½
Block coal with considerable hard, dull coal		6
Elevation	937	

The roof of this bed is excellent and is very different from the poor roof found over this coal on the lower portion of Burning fork.

Directly opposite this opening, on the left-hand side of this branch, W. E. Patrick has a shallow prospect into the same bed, which gives the following bed section:

Gun Creek Coal

	Feet	*Inches*
Block coal with much hard, dull coal		12
Soft, bright block coal		9
Block coal with considerable hard, dull coal		7
Elevation	935	

Above the opening on the right-hand side and a short distance upstream from it, a spring shows with thick coal bloom and much white bottom clay at elevation 1040. This is undoubtedly the bloom of the Fire Clay coal, though no flint fire-clay float was found.

The Tom Cooper coal is opened at the upstream mouth of a right branch 1 mile up Burning fork. The opening is on the land of the heirs of M. M. Salyer. A partial section is:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, sandy shale	5	
Hard black shale		6
Block coal		17½+
Elevation	905	

This bed was reported to be 22 inches thick.

At the head of a right fork of this branch Kenner Salyers has a completely caved opening into the Whitesburg coal. The upper portion of the roof is massive sandstone 6+ feet. Elevation of opening, 1010.

At the head of a right branch of this fork Kenner Salyers has a completely caved opening into the Fire Clay coal at elevation 1065. The coal was reported to be 4 feet 4 inches thick. Flint fire clay was found on the dump of this bed.

One mile up Burning fork, on the left, about half way between the first and second left branches there is a prospect into a bed 20 feet over the Whitesburg coal. This bed gives the following bed section:

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in the base	30	
Hard, light-gray shale		18
Splint coal		9
Elevation	1020	

The Whitesburg coal is opened in a left branch 250 yards up Burning fork, one-eighth mile up this branch, in a right drain. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		6+
Medium gray shale	3	
Hard black shale	1	
Block coal		9½
Shale		½
Block coal		4
Coal with much hard, dull coal		16½
Elevation	1020	

One and one-half miles up Burning fork above the mouth of Rockhouse fork the bloom of the Tom Cooper coal shows in natural exposure on the left of the road. The bed section is:

Tom Cooper Coal

	Feet	*Inches*
Sandy shale	2	
Hard, light-gray clay shales		1½
Dark-gray, sandy shale	1½	
Block coal		19½
Gray, bituminous shale		
Elevation	910	

The Tom Cooper coal has again been opened two miles up Burning fork on the first right branch of a right branch of Burning fork. The opening, by Jim Arnett, gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Black shale		33
Soft, bright block coal		19
Soft, gray shale floor		
Elevation	920	

Two and a half miles up Burning fork at the head of a small left branch, back of his house, John Felterly has an opening into a bed 15 to 20 feet over the Whitesburg coal. The bed section is:

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in the base	8	
Hard-gray shale	2½	
Block coal		10
Soft, light-gray clay shale		1
Block coal		4
Elevation	1050	

The Tom Cooper coal has been raised from the stream 50 yards up a small right branch opposite the abovementioned branch. An excavation on the land of William Arnett gives the following bed section:

Tom Cooper Coal

	Feet	*Inches*
Hard, black shale	3	
Coal reported		18
Elevation	925	

Three-fourths of a mile up this branch and 100 yards below the last house, in a left drain, the Whitesburg bed has been opened by William Arnett at elevation 1043. This coal bed was reported to be 4 feet thick.

The Whitesburg coal has been opened in a 15-yard entry by Mr. B. Kelly, one-eighth mile up a left branch 300 yards up Burning fork, above the mouth of the right branch last mentioned. A partial section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Black shale		21
Block coal	2+	

The Tom Cooper coal has been opened in several shallow open pits, 200 feet below the school house in a small left drain. The bed section is:

Tom Cooper Coal

	Feet	*Inches*
Hard, black shale		7+
Block coal		21
Elevation	910	

The Whitesburg coal has been opened 350 yards up in a small right drain 1¼ miles below Ivyton. An 8-yard entry by Oliver Patrick gives the following bed section:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Hard, black shale		25
Soft, bright block coal		6½
Gray shale		3
Soft, bright block coal		5½
Block coal with much hard, dull coal containing pyrite		17½
Elevation	1040	

The Whitesburg coal is again opened 500 yards upstream on the same side, 100 yards up the first small right hollow below a large right branch. The opening, by Spencer West, gives the following partial section:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	6	
Hard, black shale	3	
Soft, bright block coal		9
Block coal with much hard, dull coal		9½+
Elevation	1045	

The bottom of the bed was not reached.

The Whitesburg coal has been opened by Elza Dottson in a small left drain 550 yards up a good--sized right branch 1 mile below Ivyton. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Hard, black shale	3	
Soft, bright block coal		4¼
Soft, gray shale		¼
Soft, bright block coal		7
Block coal with much hard, dull coal		17
Hard, sandy, black shale floor		
Elevation	1037	

A section up this branch is as follows—starting 100 yards above the first left house on the branch:

Section

		Feet	Inches
Soft, dark-gray to black shales with disc-shaped, calcareous concretions		45	
Covered interval			10
Gray, calcareous, shaly sandstone		1	
Black shale		2	
Gun Creek coal	Massive sandstone..2' Black shale.........1½" Block coal with much hard, dull coal.7½" Gray shale floor	Ele. 985	
Covered interval		58	
Whitesburg coal	Massive sandstone.. 6' Black shale........15" Soft, bright block coal ....10" Block coal with much hard, dull coal....12" Dark-gray shale floor	Ele. 1043	

The two coals just mentioned were exposed one above the other in vertical section; the Gun Creek coal in natural exposure on the left bank of the stream.

The Whitesburg coal (bed section given above) is opened by Elijah Collinsworth in an 8-yard entry. The opening is three-fourths mile up this branch on the left, and opposite the house at the head of the branch. It is probable that this thickness of 45 feet of soft, dark shales is somewhat excessive, due to the dip down this branch.

The Whitesburg coal has been opened by Will Patrick in a small left branch three-fourths mile below Ivyton and 400 yards below Kelly branch. The opening is 200 yards above the first house on the branch in a small right drain. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Hard, black shale	2½	
Soft, bright block coal		9½
Block coal with much hard, dull coal		17
Elevation	1037	

Three-eighths mile up this branch, on the right, is a completely caved 15-yard entry into this bed, also by Will Patrick.

Just opposite this opening in a left drain is a partially caved, wet entry, at elevation 1034, into the same bed. The opening is on the land of Mr. Rice.

The Whitesburg coal has been opened by Butler Kelly on Kelly branch, a left branch three-fourths mile below Ivyton. The opening is now completely caved. Its location is 300 yards up a left fork of this branch, which is three-fourths mile from the mouth of this branch. The coal was reported to be 2½ feet thick here. The elevation of the opening is 1050.

The following section shows above the Whitesburg coal in a small right drain:

Section

			Feet
Fire Clay coal	Massive sandstone	Elevation	1115
	Flint fire clay.......2—3"		
	Block coal........... 5"		
Covered interval, largely sandstone			13
Shaly sandstone			2
Block coal—low split of Fire Clay coal, 6½ inches		Ele.	1100
Covered interval			47
Massive sandstone			3
Whitesburg coal		Elevation	1050

The Whitesburg coal has been opened in an 80-yard entry by T. J. Rice in a right drain, directly opposite the mouth of Kelly branch. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	2	
Hard. dark shale	1½	
Laminated coal		6
Block coal		9
Laminated coal		4
Splint coal		6
Laminated coal		5
Elevation	1030	

Two hundred and eighty yards above the mouth of Kelly branch, on the left of Burning fork, Butler Kelly has a completely caved opening into the Whitesburg coal at elevation 1039.

In the first right branch one-half mile below Ivyton, 600 yards up this branch and 250 yards up a small left hollow, on the left, Lark Hopkins has a double 30-yard entry into the Whitesburg coal:

Whitesburg Coal

	Feet	*Inches*
Hard black shale		
Soft, bright block coal		5½
Soft, black, bituminous shale parting		¼
Soft, bright block coal		6¼
Block coal with considerable hard, dull coal		18
Elevation	1018	

A thin parting near the top of this bed at the mouth of the opening is 1¼ inches thick, but it soon thins.

One hundred and fifty yards below this opening, on the main stream, an opening which is completely caved shows on the left of the stream, also into the Whitesburg coal, at elevation 1026.

The Tom Cooper coal shows in natural exposure 100 yards up the right branch of State Road fork of Middle fork, on the right bank, at the town of Ivyton. The bed section is:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	2½	
Black shale	1½	
Block coal		18
Elevation	897	

Thirty-three feet above this bed is the base of a massive sandstone 20+ feet thick and the horizon of a thin coal.

One-half mile from Ivyton at the mouth of Big branch a 3-inch coal bed is exposed directly under a massive sandstone. The massive sandstone has coal streaks cross-bedded in its base. The elevation of this bed is 935.

A section up Big branch from its mouth to its forks, a distance of three-fourths mile, is as follows:

Section

				Feet
Gun Creek Coal bed, bet. two massive sandstones	Massive sandstone		Ele.	975
	Hard, gray shale	1′		
	Coal	8½″		
Massive sandstone				40
Ivyton coal bed	Massive sandstone		Elevation	930
	Coal	3″		

This exceptionally small interval between the Whitesburg and Gun Creek coals is due to a northerly (upstream) dip on Big branch.

One-half mile up Big branch, on the left, the following section was made on the land of Tom Hackworth:

Section

	Feet
Top of high knob—Puncheon Creek sandstone......Ele.	1406
Covered interval	216
Upper break of prominent bench, heavy coal float found. A thick bed of coal (4 feet), Young coal, part cannel, was reported to have been dug into at this point ....Elevation	1190
Covered interval to stream level..............Elevation	946

Big branch forks three-fourths mile up. Six hundred yards up the left fork this fork divides into two small forks at the head.

Frank Jackson has a 25-yard entry into the Fire Clay coal one-fourth mile up the left fork opposite his house. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	10	
Dark shale	1	
Block coal		14½
Gray shale		21
Block coal		4
Shale		2
Block coal		4
Elevation	1053	

A section at the head of this fork on the road leading to Short fork is:

Section

	Feet
Base of High Rock sandstone................Elevation	1350
Covered interval	40
Coal bloom apparently 1½ feet thick (Flag coal)...Ele.	1310
Covered interval	45
Hazard coal bloom—2½ inches...............Elevation	1265
Covered interval	58
Young coal bloom—2+ feet ....Elevation	1207
Massive sandstone	36
Coal bloom { Massive sandstone { Coal ....6+" } Elevation	1171
Covered interval	16
Trace Fork coal bloom—2+ inches...........Elevation	1155
Covered interval	20
Massive sandstone	20
Haddix coal bloom.........................Elevation	1115
Covered interval	62
Fire Clay coal opening.....................Elevation	1053

The following section was taken 150 yards up the right fork of the main left fork of Big branch:

Section

				Feet
Coal bloom	Massive sandstone		4′	Elevation 1162
	Light-gray clay shale		1½″	
	Block coal		6 ″	
	Gray shale		2½″	
	Block coal		11+″	
Covered interval				8
Massive sandstone				20
Trace Fork coal	Coal bloom 1½+ feet at the lower break of a bench			Elevation 1134
	Covered interval			6
	Coal bloom	Coal	4″	Elevation 1128
		Shale	2″	
		Coal	2″	
Covered interval, massive sandstone in the lower part				89
Fire Clay coal opening				Elevation 1039
Covered interval, massive sandstone in the lower part				35
Local coal bet. the Fire Clay Coal and the Whitesburg coal	Massive sandstone		6′	Elevation 1004
	Coal		5 ″	
	Shale		½″	
	Coal		10½″	

The Whittaker coal at elevation 1162 is opened by Tony Fletcher 700 yards up this right fork on the left. Bed section and elevation are as given in section. The basal portion of this section was in water and mud and could not be reached.

The Hamlin coal is opened by Burley Pace 350 yards up this fork, on the left. The bed section is the same as that showing in the opening by Frank Jackson on the left fork.

The coal at the Fire Clay Rider or possibly the Fire Clay horizon is opened by Mason Jackson 150 yards up this fork, on the right, at stream level. No flint fire clay was seen either in the bed section or in the dump.

Two hundred and fifty yards up the right fork of Big branch the Whitesburg coal shows in the bed of the stream. The bed section is as follows:

Whitesburg Coal

	Feet	Inches
Massive sandstone with coal streaks cross-bedded in base	3	
Light-gray sandy shale	5	
Thin bed of shaly sandstone	2	
Soft, gray shale	3	
Block coal		2½
Sandy shale		6
Shaly sandstone		
Gray shale	2	
Block coal		1½
Elevation	975	

A noteworthy feature of this exposure was a fossil tree trunk found in place between the two thin coal beds.

One-half mile up this right fork and 200 yards up a right branch the Fire Clay coal has been opened. The bed section is as follows:

Fire Clay Coal

	Feet	Inches
Thin-bedded sandstone	3	
Coal bloom		7
Light-gray, sandy shale		28
Block coal		4
Light-gray shale		1
Block coal		1½
Flint fire clay		3½
Light-gray shale		3
Block coal		6
Elevation	1035	

A coal which is a low split of the Fire Clay coal has been dug from the bed of this branch 100 yards above the Fire Clay coal opening. The coal was reported to be 12 inches thick; soft shale shows in the stream bed within 2 feet of the top of the coal. The elevation of this bed is 1020.

Three-fourths mile up this fork and just above the last house on the fork the Haddix coal shows in natural exposure at stream level. An apparent bed section is:

Haddix Coal

	Feet	Inches
Massive sandstone		
Cannel slate		6
Shale		1½
Block coal		6½
Elevation	1105	

POUND BRANCH

This is a right fork of the Narrows fork of Jennie creek in Magoffin county.

One-quarter of a mile up Pound branch, on the right, Edgar Hurtt has an opening into the Whitesburg coal at stream level. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone with coal streaks cross-bedded in the base	1½	
Soft, gray clay shale		35
Hard, black shale	1½	
Block coal		1
Shale		1½
Block coal with much hard, dull coal		
Elevation	977	

One-half mile above Ivyton the right fork of Middle creek forks. Big branch constitutes the right fork.

From a point one-half mile up this fork for 700 yards upstream the following section was obtained:

Section

				Feet
Beds of sandy shale and thin beds of massive sandstone alternating				5
Thin gray, soft sandy shales				32
Soft shales				
Massive fine-grained sandstone				1
Gun Creek coal	Block coal	8 ″	Elevation	960
	Soft gray shale	15½″		
	Block coal	4 ″		

Seven-eighths mile up this fork, on the left, the Whitesburg coal is opened by Robert Stone in a wet inaccessible 25-yard entry at stream level and elevation 1005.

Six hundred yards below Ivyton, on the left bank of State Road fork of Middle creek, the Lacey Creek coal shows in natural exposure. The bed section is as follows:

Lacey Creek Coal

	Feet	*Inches*
Shaly sandstone	4	
Soft, bright block coal		17½
Black shale floor		
Elevation	863	

The Whitesburg coal is opened on a left drain, 100 yards below this exposure. An opening has been made here by William Crace 30 to 40 yards deep, but is now partly caved and wet. An immediately adjoining prospect gave the following bed section for this bed:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	4	
Hard, dark shale		
Block coal		5½
Light-gray shale		1
Block coal		7
Block coal with considerable hard, dull coal		17½
Elevation	1045	

This gives the Whitesburg-Lacey Creek coal interval as 182 feet. It is probable that the interval is actually somewhat smaller than this as there is a strong northeast dip here and the Lacey Creek coal exposure is several hundred yards northeast of the opening into the Whitesburg coal.

The Whitesburg coal has been opened in a 15-yard entry by Frank Pole in a small left-hand branch, three-fourths mile below Ivyton and one-fourth mile up a right fork of this branch. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	3	
Black shale	2½	
Block coal		5
Light-gray, clay shale		1½
Block coal		7
Block coal with much hard, dull coal		18
Elevation	1045	

One hundred and twenty yards up this branch above the mouth of this right fork the Tom Cooper coal has been prospected by Frank Pole. The bed section follows:

Tom Cooper Coal

	Feet	*Inches*
Light-gray, soft clay shale	3	
Soft black shale		22
Block coal		21
Elevation	907	

The roof of this bed is very poor.

The Whitesburg coal bloom has been faced by Frank Pole for a reported thickness of 31 inches. The prospect is now caved. This prospect is on the right of a left drain one-half mile up Pole's branch.

Seven-eighth mile below Ivyton is a left branch known as Limestone branch. Two hundred and fifty yards up Limestone branch the following section was obtained on the right of the branch:

Section

		Feet	Inches
Bench			
Covered interval		65	
Whitesburg coal	Massive sandstone 2½′ Black shale......11 ″ Block coal....... 7 ″ Block coal with much, hard, dull coal ....14 ″	Ele. 1050	
Covered interval		70	
Massive sandstone		35	
Shaly sandstone		5	
Massive sandstone		8	
Shaly sandstone and thin beds of fine-grained sandstone		11	
Massive sandstone		8	
Ivyton coal.......Elevation 913			3+
Sandstone and shaly sandstone		33	
Tom Cooper coal (split).......Elevation 880			19½
Shaly sandstone		7	
Massive sandstone		4½	
Black shale		1	
Coal.......Elevation 868			8—
Soft, dark-gray shale		2	
Light-gray, hard sandy shale		1	
Calcareous sandstone with large, impure calcareous concretions			15
Hard shale		1	
Calcareous sandstone		2	
Hard, light-gray shaly sandstone		16	

The Lacey Creek coal is opened one-fourth mile up Limestone branch on the left. An opening by Jim Howard gives the following bed section:

Tom Cooper Coal

	Feet	Inches
Light-gray, soft clay shale	3	
Hard black shale		16½
Block coal		20½
Light-gray clay shale		
Elevation	887	

Sixty yards below this opening the following bed section of this bed shows in natural exposure. Bed section is:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	3½	
Hard, black shale		11
Block coal		8
Medium gray, soft shale floor		
Elevation	881	

One and one-eighth miles below Ivyton, on State Road fork of Middle fork, is a left branch known as Big Lick.

Three hundred yards up Big Lick, on the left, John Howard has a 20-yard entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	3½	
Block coal		17
Block coal with much hard, dull coal		15½
Elevation	1017	

Six hundred yards up Big Lick, on the right, a caved opening shows into the Tom Cooper coal at elevation 895. The roof only shows.

Three-eighths mile up Big Lick, on the left, Dial Barnett has an opening into the Tom Cooper coal. The bed section is:

Tom Cooper Coal

	Feet	Inches
Light-gray shale		
Hard black shale		2½
Block coal		22
Soft, light-gray clay shale		
Elevation	895	

One-half mile up Big Lick, on the right, the following section was obtained:

Section

	Feet
Highest bench on the hillside, and coal bloom reported to have been faced for 5 feet, not less than 4 feet. Trace Fork coal. Elevation	1185
Covered interval	145
Whitesburg coal bloom. Elevation	1040

One hundred and fifty yards above the point at which this section was taken, on the right hand of Big Lick branch, Tiny Cole has a completely caved opening into a bed at about the horizon of the Fire Clay coal, or possibly a little above the Fire Clay coal, and therefore probably the Fire Clay Rider at elevation 1088. This bed was reported to be 30 inches thick. No flint fire-clay fragments could be found in the dump.

Five-eighths mile up Big Lick, on the right, the Whitesburg coal has been opened in a 20-yard entry by Tiny Cole on the left of a right gully. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	15	
Hard, black shale		4½—13
Block coal		9¼
Soft, bright-gray shale		¾
Block coal		3
Block coal with much hard, dull coal		17
Dark-gray shale		
Elevation	1020	

The Gun Creek coal has been opened by Mrs. Peggy Cole 150 yards up the left fork of Big Lick branch on the left. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Light-gray clay shale	4	
Hard, black shale		3
Block coal		18

One-quarter of a mile up the left fork of Big Lick, on the left, Garfield Fletcher has an opening into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2½	
Hard, black shale		13
Block coal		7½
Block coal with much hard, dull coal		11
Elevation	1000	

Sixty yards further upstream, on the left, is a completely caved opening into the same bed.

The Whitesburg coal has been opened in a 10-yard entry by Ferris Cole, 250 yards up the right fork of Big Lick branch, on the right, in a small gully. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Block coal		14
Block coal with much hard, dull coal		15½
Sandy shale floor		
Elevation	1020	

The Gun Creek coal has been opened in an opening, now completely caved, one-fourth mile up this fork on the left. The elevation of the opening is 955.

The Whitesburg coal is opened by Elbert Cole 650 yards up this fork on the left, 100 yards up a left drain. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Hard, black shale		24
Block coal		7
Shale		1
Block coal with much hard, dull coal		14
Elevation	1010	

Less than 100 yards below the mouth of Big Lick on the right-hand side of the stream the following section shows:

Section

		Feet
Place of Whitesburg coal	Elevation	1015
Covered interval		165
Massive sandstone		3
Light-gray, sandy shale		12
Medium gray, hard shale		4
Light-gray sandstone—1½ feet	Elevation	834

On State Road fork of Middle creek, one and one-third miles below Ivyton, there is a left branch known as Bear branch. One-eighth mile up Bear branch, on the left, Mrs. Lula Cowles has a caved opening into the Tom Cooper coal at elevation 880.

An opening by Mrs. Lula Allen directly across the branch at the same elevation gave the following bed section:

Tom Cooper Coal

	Feet	Inches
Massive sandstone		
Gray shale, becoming black and bituminous in the lower portion	3	
Block coal		7
Shale		½
Black coal with considerable hard, dull coal in the lower portion		17
Elevation	880	

Just below this prospect, in the bed of the stream, the Lacey Creek coal shows in natural exposure:

Lacey Creek Coal

	Feet	Inches
Light-gray shale		
Block coal		8½
Elevation	855	

Three hundred yards up Bear branch, on the left, the Whitesburg coal has been opened in a 25-yard entry by Dan Prater. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	5	
Hard, black shale	1	
Block coal		14
Block coal with much hard, dull coal		18
Elevation	1015	

There is a strong east dip into the hill here.

Three hundred and fifty yards up a left branch, 600 yards up Bear branch, the Whitesburg coal has been opened by Will Barnett. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Block coal		4
Shale		½
Block coal		1
Block coal with much hard, dull coal		20½
Elevation	1008	

The Whitesburg coal has been opened one-half mile up Bear branch on the right. The opening at elevation 1015 is completely caved.

Six hundred yards below the mouth of Bear branch and one-half mile above the county line is a right branch, owned by Levi Allen.

The Tom Cooper coal has been opened by Levi Allen in a 10-yard entry, 550 yards up this branch near stream level. The bed section is:

Tom Cooper Coal

	Feet	Inches
Massive sandstone	11	
Light-gray shale		22
Block coal		24
Black, bituminous shale floor		
Elevation	875	

The Whitesburg coal is opened in a 15-foot entry just above this opening into the Tom Cooper bed. This opening, also by Levi Allen, gives the following bed section:

Whitesburg Coal

	Feet	Inches
Massive sandstone	15	
Hard, black shale	2	
Block coal		6½
Shale		1½
Block coal		3
Shale		½
Block coal		20
Soft, light-gray shale floor		
Elevation	1010	

A slight dip into the hill in an east or northeast direction shows here.

A section on this branch is as follows:

Section

	Feet	Inches
Massive sandstone	15	
Hard, black shale	2	
Whitesburg coal .... Elevation	1010	
Covered interval	122	
Massive sandstone	11	
Light-gray shale		22
Tom Cooper coal .... Elevation	875	
Covered interval	18½	
Soft, black shale	1½	
Covered interval	5	
Thin bed of massive sandstone	1	
Covered interval	2	
Calcareous fine-grained sandstone with small ferruginous concretions	1	
Sandy shales and shaly sandstone	31	
Stream level at mouth of branch		

One-half mile below this branch is a left branch which runs along the county line. One-half mile up this branch, on the left, the Tom Cooper coal shows in natural exposure. A partial section is:

Tom Cooper Coal

	Feet	*Inches*
Massive sandstone	3	
Gray shale	6	
Cannel slate		3
Block coal	1	
Elevation	890	

Three-quarters of a mile up this branch and 100 yards up a small right hollow L. C. Dottson has an opening into the Whitesburg coal. A partial section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	6	
Hard, black shale	1½	
Block coal		18+
Elevation	1010	

The coal here is probably between 26 inches and 30 inches thick.

A combined section on this branch is as follows:

Section

		Feet
Bench		
Covered interval		25
Massive sandstone		67
Covered interval		8
Place of Whitesburg coal	Elevation	1010
Covered interval		2
Sandy shale		5
Massive sandstone		3
Covered interval		5
Light-gray, sandy shales		40
Covered interval		5
Massive sandstone		45
Soft, dark-gray shale		14
Dark-gray shale, carrying calcareous concretions with sphalerite—place of Tom Cooper coal—1 foot	Ele.	890
Shaly sandstone		40
Covered interval		5
Sandy shales		37
Dark-gray, impure limestone		3
Hard, light-gray sandy shales		20
Level of the branch at the mouth	Elevation	785

One-fourth of a mile above the mouth of Burning fork, on the left of the road, the Tom Cooper coal shows in natural exposure. The bed section is as follows:

Tom Cooper Coal

	Feet	Inches
Black shale		
Block coal		14
Light-gray clay shale floor		
Elevation	850	

One-half mile up this road above the mouth of Burning fork the Gun Creek coal shows in natural exposure on the left of the road. The bed section follows:

Gun Creek Coal

	Feet	Inches
Light-gray micaceous sandstone with coal streaks cross-bedded in the base	2	
Block coal		3
Hard, flinty parting		¾
Splint and block coal mixed		3¾
Shale		1¾
Splint coal		6
Light-gray clay shale floor		
Elevation	925	

There appears to be a minor fault here with downthrow on the south. This fault is indicated by a sudden termination of the coal bed against shales and a disturbance of the rocks. There is a very noticeable N. W. dip on the N. W. side of the fault and the strata lie nearly horizontal on the south side of the fault. This fault is purely local and the throw cannot be greater than 15 feet.

The following section was obtained at the point where the river makes a sharp bend about half way between the mouths of Burning and Mason forks:

Section

	Feet
Massive sandstone	30
Covered interval	27
Tom Cooper coal bloom under black shale.....Elevation	876
Thin-bedded calcareous sandstones and shaly sandstone	20

The following section was obtained on the Mason Fork road three-fourths mile from the mouth of Burning fork:

Section

	Feet
Place of Gun Creek coal.................Elevation	935—940
Massive light-gray to white fine-grained sandstone with large calcareous concretions up to 10 feet in diameter	28
Light-gray clay shale............................	4
Massive sandstone and shaly sandstone..............	50

The Gun Creek coal is opened by Alonzo Keeton, 350 yards above the ford of the Licking River road:

Gun Creek Coal

	Feet	Inches
Light-gray clay shale........................	5	
Dark-gray slaty shale........................	1½	
Block coal		7½
Light-gray clay shale........................		9½
Block coal		1¾
Light-gray clay shale		20½
Block coal		8
Shale		3
Block coal		13
Black shale		
Elevation	885	

One hundred and fifty yards above this opening, on the left of the road, the Gun Creek coal is again opened by Alonzo Keeton. The bed section is:

Gun Creek Coal

	Feet	Inches
Block coal		3
Gray shale		12
Block coal		1½
Light-gray clay shale........................		24
Block coal		8
Shale		1¾
Block coal		14½
Elevation	887	

A section at this point from this coal opening to the river bed is:

Section

	Feet
Hard, light-gray clay shales.........................	29
Dark-gray, sandy shales with small disc-shaped calcareous concretions	8
River level	

MASON FORK

Mason fork enters Licking river on the left, 2½ miles above the mouth of Burning fork.

The bloom of the Gun Creek coal shows at elevation 884 on the left bank of Mason fork, 500 yards up. The coal was reported 14 inches thick.

Three-eighths mile up Mason fork, on the left, the bloom of the Whitesburg coal shows at elevation 946.

One-half mile up Mason fork, at the head of a small right branch Roland May has an opening into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Thick-bedded, medium gray clay shale	1	
Block coal		3
Light-gray clay shale		3½
Block coal		4½
Bituminous, hard, clay shale		3½
Flint fire clay		2
Splint coal		14½
Elevation	1030	

The dark-gray to black shales with calcareous concretions, which frequently come between the Gun Creek and Tom Cooper coals, show in the bed of the stream, one-half mile up Mason fork.

The Gun Creek coal has been opened by Willy May three-fourths mile up Mason fork on the left bank of the stream, 18 feet above the stream. The bed section follows:

Gun Creek Coal

	Feet	Inches
Dark-gray to black shale		3—4
Block coal		3
Black shale		6½
Block coal		3
Light-gray shale		4
Block coal		8
Light-gray shale		19½
Block coal		11½
Elevation	940	

At this point in Mason fork a pronounced downstream dip shows, the strata rising about with the stream.

Seven-eighths mile up Mason fork, at the head of a small right branch, the following section was obtained on the road going from Mason fork to Licking river:

Section

		Feet
White-bottom clay	Elevation	1188
Covered interval		176
Fire Clay coal bloom and flint fire-clay float	Elevation	1030
Covered interval		9
Coal bloom	Elevation	1021
Covered interval		50
Whitesburg coal bloom	Elevation	971

The Fire Clay coal has been opened in a 20-yard entry by Willy May 1¼ miles up Mason fork in a small right drain. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	6	
Block coal		1
Shale		2
Block coal		1
Shale		⅛—1
Block coal		6½
Flint fire clay		3½
Splint coal with some hard, dull coal at the base.		23½
Bituminous shale floor		
Elevation	1050	

Two miles up Mason fork, on the left and just below the last left-hand house, the following section was obtained in natural exposure:

Section

			Feet
Bench			
Covered interval			110
Fire clay coal	Block coal 6" Shale 12" Flint fire clay and coal 3"	Elevation	1045
Covered interval			15
15-inch block coal		Elevation	1030
Massive sandstone			2—3
Hard, dark-gray, sandy shales			12

One-quarter of a mile up Licking river above the mouth of Mason fork and 150 yards above the mouth of the first left branch above Mason fork the bloom of the Gun Creek coal shows 5 feet over the river at elevation 855.

The Gun Creek coal shows in natural exposure, 120 yards up the second left branch, above the mouth of Mason fork, on the left. A partial section is:

Gun Creek Coal

	Feet	Inches
Block coal		4±
Light-gray, clay shale		9
Block coal		5
Elevation	870	

The Gun Creek coal has been prospected by Sarah Spurlock back of her house, the first house on the right of this branch. The prospect here shows the following bed section:

Gun Creek Coal

	Feet	Inches
Black slate		8+
Block coal		7½
Light-gray shale		9
Coal		6
Light-gray shale		33
Block coal		12½
Elevation	898	

The following section shows up a small right drain just above her house:

Section

		Feet
Whitesburg coal bloom	Elevation	970
Interval—shaly sandstone and sandy shale		71
Gun Creek coal	Elevation	899

One-fourth of a mile up this branch, on the left, just above the second right house, the bloom of the Gun Creek coal shows at elevation 909.

Two-thirds of a mile up this branch, at the head of the branch, a completely caved opening by Mr. Powers shows into a coal bed at elevation 1025. Considerable coal has been removed from this opening. No flint fire-clay float could be found on the dump, but the only bed which would be of workable thickness at this horizon is the Fire Clay coal.

Three miles up the river above the mouth of Mason fork is a small left branch which enters Licking river at the large horseshoe-shaped bend just above Stinson creek.

On the right of the first left-hand branch on this branch is an opening into the Fire Clay coal by Jacob B. Vanderpool. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Block coal		6
Flintfire clay		2—4
Block coal		7½
Flint fire clay		½
Light-gray shale		½
Block coal		11½
Hard, gray, shale floor		
Elevation	1008	

Fifteen feet upstream from this opening is another 15-yard entry which gives the same bed section and roof. This opening was partly caved and wet.

The following section was obtained at the head of this branch:

Section

		Feet
Massive, fine-grained sandstone		20
Covered interval		10
Young coal bloom	Elevation	1151
Covered interval		68
Haddix coal bloom	Elevation	1083
Covered interval		75
Horizon of fire clay coal		
Elevation		1008

Two hundred and forty yards up this branch, in a right hollow, Mr. Vanderpool has a 15-yard entry into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone with coal streaks cross-bedded in the lower portion	6	
Block coal		9
Flint fire clay		4
Block coal		11
Light shale		½
Hard, block coal		13
Soft, black, shale floor		
Elevation	1013	

One-fourth mile up this branch, on the left of the left fork, the Fire Clay coal has been opened in a 30-yard entry by Butler Vanderpool. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	9	
Block coal		9
Flint fire clay		3
Hard, block coal		24
Hard, black, shale floor		
Elevation	1034	

The Fire Clay coal is opened by Mrs. A. Fletcher in a small left-hand branch, five-eighths mile below the mouth of Montgomery branch. The opening is one-half mile up the branch on the left. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	3½	
Block coal		5
Flint fire clay		3½
Block coal		12
Soft, light-gray shale		8
Block coal		7
Hard, shale floor		
Elevation	1014	

At the left of the mouth of the small left branch directly opposite the mouth of Montgomery branch, Kennel Arnett has a 15-yard entry into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	3	
Block coal		2½
Flint fire clay		3
Block coal		23
Black, bituminous, shale floor		
Elevation	1018	

There is a good-sized branch on the left of Licking river 2¼ miles long, just above the mouth of Montgomery branch. One and one-eighth miles up this branch, on a left fork, Jolly Arnett has a 12-yard entry into the Fire Clay coal. The opening is partly caved and the lower portion of the bed is covered by sand. The section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	5	
Light-gray, hard, sandy shale		2½
Block coal		10½
Flint fire clay		4½
Block coal		22
Black shale floor		
Elevation	1017	

On the left of the mouth of the above-mentioned branch, Kennel Arnett has two adjacent 25-yard entries into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3	
Block coal		8
Flint fire clay		4
Block coal		23½
Hard, black shale floor		
Elevation	1016	

The following openings into the Fire Clay coal are within a distance of one-fourth mile on the left bank of the river opposite the mouth of Oakley creek. The one of these openings farthest downstream, owned by S. O. Arnett, is 200 yards below the mouth of Oakley creek. A partial section is:

Fire Clay Coal

	Feet	Inches
Light-gray, massive sandstone	30	
Shale		2
Splint coal		9
Flint fire clay		2
Block coal		20+
Elevation	982	

Two hundred yards above this opening J. G. Arnett has a 10-yard entry which gives the following bed section:

Fire Clay Coal

	Feet	Inches
Massive, light-gray to white sandstone		
Hard, black shale		1
Splint coal		12
Bituminous, clay shale		2
Flint fire clay		2
Block coal		22½
Bituminous shale		2
Coal		1
Light-gray, clay shale floor		
Elevation	990	

Three hundred feet upstream, on the same side, Jolly Arnett has a 70-yard entry into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Light-gray, white, massive sandstone	4	
Hard, bituminous shale		½
Splint coal		24
Light-gray, clay shale floor		
Elevation	990	

SALYERS BRANCH

One mile above the mouth of Oakley creek is a left branch known as Salyers branch. The road to Salyersville by way of Mason fork goes up this branch.

The Fire Clay coal has been opened by Judge Salyers in a 75-foot entry on a point back of his house, just below the mouth of this branch. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	8	
Block coal		10½
Flint fire clay		2 to 2½
Block coal		25+
Elevation	990	

The bottom of this bed was probably not reached at the time of measurement. Mr. J. M. Hodge, in Vol. 1, Part II, K. G. S. 1913, p. 898, states that an opening at this location by Judge R. Salyers gave 8 inches of coal above the flint fire-clay parting and 25 inches below.

Just above this above-mentioned entry is an old, abandoned, completely caved opening, which is probably the one in which Mr. Hodge's bed section was obtained.

The following section was obtained at this locality:

Section

			Feet
Massive sandstone			15
Covered interval			20—30
Bench		Elevation	1098
Covered interval			35
Massive sandstone in the upper portion			55
Massive sandstone			1½+
Light-gray, clay shale			1½
Hamlin coal—reported to be 24-inch to 30-inch solid coal		Elevation	1030
Covered interval			32
Massive sandstone			8
Fire clay coal opening		Elevation	990
Covered interval			40
Whitesburg coal	Shale Coal .... 8½" Parting Concealed	Elevation	950
Covered interval			60
Gun Creek coal bloom (coal reported 18 inches thick with some partings		Elevation	890

The Fire Clay coal is opened by Judge Salyers in a 15-foot entry on the left of a left hollow one-fourth mile up Salyers branch. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	3½	
Block coal		11½
Flint fire clay		3½
Block coal		24
Bituminous, shale floor		
Elevation	1000	

At the mouth of this left hollow on the right the Gun Creek coal shows in natural exposure—coal bloom 18½ inches thick with evidence of partings. Elevation 900.

Three-eighths mile up Salyers branch, 200 feet up a right drain opposite the first house on the left of the road, the Whitesburg coal has been prospected. The bed section is as follows:

Whitesburg Coal

	Feet	Inches
Massive sandstone	2½	
Block coal		13
Light-gray, soft, clay shale		5+
Elevation	963	

It is quite possible that there is a thin seam of coal under the shale, which appears to form the floor of this bed.

One-half mile up Salyers branch, on the right, a completely caved opening into the Fire Clay coal shows about 100 feet above the road at elevation 1008. Massive sandstone shows over the roof for 18+ feet.

The bloom of the Gun Creek coal shows one-half mile up Salyers branch at the left of the mouth of a small right branch. A natural exposure here shows:

Gun Creek Coal

	Feet	*Inches*
Soft, light-gray, clay shales	15	
Block coal		7
Light-gray, clay shale		4
Block coal		6½
Light-gray, clay shale		7½
Block coal		1
Light-gray, clay shale		1¾
Block coal		13
Hard, gray, sandy shales	1	
Shaly sandstone		4
Sandy shales	2	
Light-gray, clay shales	6	

Three hundred yards up the right branch which has its mouth at this point the Fire Clay coal has been opened in a 20-yard entry, by R. C. Salyer, in a right drain. The bed section follows:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	6	
Block coal		1½
Light-gray shale		1¾
Block coal		1
Light-gray shale		½
Block coal		7½
Flint fire clay		2
Block coal		23
Medium-gray shale floor		
Elevation	1033	

Directly across the branch from this opening the bloom of the Whitesburg coal shows in a left drain under 2½+ feet of thin-bedded sandstone. The elevation is 991.

The Fire Clay coal has been opened by R. C. Salyer in a left branch one-half mile up Salyers branch. The opening is 100 yards up the left fork of this branch on the right. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	5	
Block coal		1¼
Shale		1¼
Block coal		6½
Flint fire clay		3
Block coal with a little hard, dull coal		21½
Elevation	1051	

One hundred yards up the right fork of this branch, on a right drain, R. C. Salyers has an opening into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	Inches
Massive sandstone	1½	
Block coal		¾
Shale		1¼
Block coal		6½
Flint fire clay		3
Block coal		22½
Elevation	1051	

A bloom of the Whitesburg coal shows on the left bank of this branch with black slate roof, at elevation 1001.

Two-thirds of a mile up Salyers branch, on the right of the branch, the following section was obtained:

Section

Gray, shaly sandstone	1½	
Whitesburg coal		6
Covered interval	15	
Calcareous sandstone	1	
Light to medium-gray, shaly sandstone	34	
Covered interval (place of Gun Creek coal) 18 feet ....Elevation	918	
Black-gray, sandy shale	2	

Three-quarters of a mile up Salyers branch and one-eighth mile up a good-sized left branch, in a left drain, Mort Salyer has a 15-yard entry into the Fire Clay coal.

Fire Clay Coal

	Feet	Inches
Massive sandstone	4	
Light-gray. clay shale		3
Block coal		2¾
Light-gray shale		1¼
Splint coal		1¼
Gray shale		⅛
Block coal		6½
Flint fire clay		2¾
Block coal		21½
Gray shale floor		
Elevation	1040	

Just below this entry a heavy coal bloom shows at elevation 997. This is the Whitesburg coal.

One mile up Salyers branch, in a right hollow, a split of the Fire Clay bed has been opened at elevation 1026 by an entry, now completely caved. The bed was reported to be:

	Inches
Cannel coal	8
Shale	18—20
Block coal	26

One and a quarter miles up Salyers branch, 150 yards up the right fork of the branch, on the left, the bloom of the Fire Clay coal shows at elevation 1047. The bed is here thin, less than 1 foot thick and without the characteristic massive sandstone roof, the roof being light-gray clay shale. The flint fire-clay parting is present.

The following section was obtained on the road going to Mason fork:

Section

			Feet
Fire clay coal bloom	Coal 4¼" Flint fire clay 1¼" Coal 18½"+ Bottom not reached	Elev.	1050
Light-gray, clay shales and sandy shales			53
Whitesburg coal bed 1½"+		Elevation	997

Two hundred and fifty to 300 yards above the mouth of Salyers branch is another left-hand branch, known as Meadow branch. The Gun Creek coal shows in natural exposure one-half mile up this branch on the right of the road on the land of Harris Howard. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Block coal		3½
Light-gray, clay shale		3½
Block coal		6½
Shale		4½
Block coal		12½
Elevation	930	

One mile up Meadow branch in a left drain, 100 yards below the last house on the branch, Harris Howard has an opening into the Fire Clay coal. The opening was completely caved at the time of visit. No flint fire-clay float was seen on the dump.

One-third mile above the mouth of Meadow branch, on the left side of the river, Harris Howard has a 40-foot entry into the Fire Clay coal. The bed section is:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	6	
Light-gray shale		1
Block coal		3½
Light-gray, clay shale	3	
Block coal		4
Light-gray shale		5½
Block coal		1½
Shale		1¼
Block coal		8
Flint fire clay		2½
Block coal		16+
Elevation	1000	

The bottom of the bed was not reached, but it is not probable that it was more than 3 to 4 inches thicker than measured.

GUN CREEK

Elevation of mouth, 872.

The Gun Creek coal has been opened one-half mile up Gun creek on a left branch which enters Gun creek just where the road makes a sharp turn.

Sam Stephen's opening at the mouth of this branch, on the right, gives the following bed section:

Gun Creek Coal

	Feet	Inches
Thin-bedded, light-gray shale	7	
Block coal		8¼
Shale		¾
Block coal		8
Shale		3
Block coal		13½
Elevation	928	

A 20 foot entry by Harris Howard on the left of this branch, directly opposite the above-mentioned opening, has this bed section:

Gun Creek Coal

	Feet	Inches
Gray, clay shale		
Block coal		18
Shale		4
Block coal		11
Light-gray, shale floor		
Elevation	929	

This coal is again opened one-third mile up the branch, at elevation 940. The opening is completely caved.

One-half mile up the branch, on the right, is a 10-yard entry into the Gun Creek coal. The bed section is:

Gun Creek Coal

	Feet	Inches
Light-gray, clay shale	5	
Block coal		17
Shale		5
Block coal		13½
Elevation	947	

Two-thirds of a mile up this branch a dip of 5° N. 60° W. was measured on shales in the bed of the branch.

Two hundred yards up the middle one of three forks at the head of this branch the Whitesburg coal has been prospected. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	2	
Light-gray, clay shale		1¾
Block coal		7
Hard Shale		2½
Block coal		13
Gray, shale floor		
Elevation	1012	

Two-thirds of a mile up Gun creek the Gun Creek coal has been opened just above the first house on the left of Gun creek. A partial section is:

Gun Creek Coal

	Feet	Inches
Light-gray, clay shale	5	
Block coal		20
Shale		4
Block coal		8+
Elevation	920	

The bottom could not be reached.

Three-fourths of a mile up Gun creek, in a right hollow, the Fire Clay coal has been opened in an 80-yard entry by Fred Patrick. The bed section is:

Fire Clay Coal

	Feet	Inches
Block coal		19
Shale		16—18
Block coal		8½
Flint fire clay		2¾
Block coal		7¾
Elevation	1008	

Below this opening in a left drain on this hollow the Whitesburg coal shows in natural exposure. A partial section here is:

Whitesburg Coal

	Feet	Inches
Dark shale	1	
Block coal		10
Shale		8
Coal		11+
Elevation	961	

The bottom of the bed was not reached.

The Gun Creek coal has been opened by Fred Patrick 100 yards up a small left branch, directly opposite the above-mentioned right branch. The partial bed section is:

Gun Creek Coal

	Feet	Inches
Thin-bedded, massive sandstone, followed by shale	3	
Block coal		18
Shale		4
Block coal		11½+

The bottom of this bed was not reached.

Seven-eighths mile up Gun creek, on the left of the stream, is a completely caved opening into the Whitesburg coal on the land of Mrs. Eliza Carpenter. The elevation of the opening is 975.

Sixty feet below this caved opening is an opening into the Gun Creek coal, also owned by Mrs. Eliza Carpenter. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	1½	
Block coal		7
Shale		¾
Block coal		6
Shale		2
Block coal		8
Elevation	915	

One and one-eighth miles up Gun Creek, in a right hollow just above her house, Mrs. Eliza Carpenter has a completely caved opening into the Fire Clay coal at elevation 1020. The bed was reported to be between 2 and 3 feet thick.

Below this opening the Whitesburg coal has been opened by Mrs. Eliza Carpenter. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Dark shale	3	
Block coal		10½
Shale		2
Block coal		20
Elevation	986	

Just opposite this small right hollow is a good-sized left branch, known as Bill May branch. Two hundred and fifty yards up Bill May branch, on the left, Sam Stephens has a 30-yard entry into the Gun Creek coal. A partial section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone	4	
Block coal		9
Shale		3
Block coal		24+
Elevation	923	

From the base of the 3-inch parting to the floor on which the roof supports rest is 27 inches.

Three hundred and fifty yards up, on the left, Sam Stephens has another opening into the Gun Creek coal. An incomplete section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone		
Block coal		7
Shale		5
Block coal		12
Shale parting or floor		
Elevation	935	

One-fourth of a mile up Bill May branch, on the right, the Gun Creek coal has been opened by Jane Fletcher. The bed section is:

Gun Creek Coal

	Feet	*Inches*
Massive sandstone		
Block coal		7½
Shale		3
Block coal		8
Shale		8
Block coal		11½
Dark-gray to black shale		
Elevation	946	

Two hundred and eighty feet above this opening, on the left, Jane Fletcher has an opening into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive, light-gray to white sandstone with thin coal streaks cross-bedded in the base	3	
Block coal		7½
Shale		6
Black coal		11½
Dark shale floor		
Elevation	1009	

Three quarters of a mile up Bill May branch, on the left, 250 yards above the above-mentioned opening, Fred Patrick has a 25-yard entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	3	
Block coal		7½
Shale		0—¾
Block coal		19½
Elevation	1011	

Three hundred and fifty yards up Gun Creek, above the mouth of Bill May branch, on the right, Mrs. Carpenter has a 12-foot entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive, thin-bedded sandstone	6	
Black, slaty shale	1½	
Block coal		8
Medium-gray shale		2
Block coal		19
Elevation	983	

The Gun Creek coal is opened by Tom Patrick 150 yards up the right fork (Patrick fork) of Gun creek. A 30-yard entry near stream level gives the following bed section:

Gun Creek Coal

	Feet	*Inches*
Shaly sandstone	4½	
Block coal		14½
Shale		3½
Block coal		13
Elevation	925	

The roof of this bed holds much better than is usual in the Gun Creek coal.

Five hundred yards up this fork, at elevation 933, soft gray calcareous shales with impure calcareous concretions show in the bed of the stream.

Three-eighths mile up this fork and fifty yards below his house Tom Patrick has a 15-yard entry into the Whitesburg coal on the left. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Hard, black shale	5	
Block coal		11¼
Shale		4½
Block coal		16½
Light-gray shale floor		
Elevation	945	

Three hundred yards up the right branch which enters this fork, just below Tom Patrick's house and directly opposite the above mentioned opening, a coal shows in natural exposure on the left bank of the stream, near stream level. This is a low split of the Fire Clay coal. The bed section is:

Low Split of Fire Clay Coal

	Feet	Inches
Hard, gray, clay shale	8	
Block coal		17½
Shale	3	10½
Block coal		8
Elevation	976	

This coal correlates with the bed found on Burning fork between the Whitesburg and the Fire Clay coals.

The Whitesburg coal was seen to go under drainage at about elevation 950; 100 yards up this branch.

The following section was obtained on this branch:

Section

		Feet	Inches
Base of massive sandstone forming ledges... Elev.		1104	
Covered interval		81	
Light-gray shale		14	
High split of Fire Clay coal	Splint coal		6½
	Light-gray shale		14
	Bituminous shale		4
	Block coal with much hard, dull coal		6
Soft, light-gray clay shale			15+
Covered interval		9½	
Light-gray clay shale		4	
Fire Clay coal—caved opening—coal reported 18—20 inches thick			
Covered interval		6½	
Light-gray shale		8	
Low split of Fire Clay coal	Block coal		17½
	Shale	3	10
	Block coal		8
Covered interval		25—30	
Whitesburg coal	Elevation	945	

One coal bed and possibly two come between the base of this cliff and the Fire Clay coal. Three hundred yards below the mouth of this branch the following section was obtained on the right:

Section

		Feet
Base of massive ledge-forming sandstone	Elevation	1098
Covered interval		33
Haddix coal bloom	Elevation	1065
Covered interval		42
Fire Clay rider coal bloom	Elevation	1023

The sandstone mentioned at the top of the two preceding sections is a massive sandstone coming 90 to 100 feet above the Fire Clay coal and may be the sandstone which is frequently found between the Fossil limestone and the Young coal.

One-half mile up the right fork above Patrick's house a thin 8½-inch coal bed shows between shales at stream level at elevation 981. This is one of the split beds which come at the horizon of the Fire Clay coal in this region and is probably a low split of the bed.

Two and a quarter miles up Patrick fork, in the bed of the stream, by a house, coal has been dug from a bed at the Fire Clay horizon on the land of F. H. Patrick. The coal was reported to be 18 inches thick. The elevation of the bed is 1001.

One hundred yards up stream and 8 feet above the last-mentioned bed is a completely caved project into a bed reported to be 30 inches thick with no partings.

Two and a half miles up the fork on the left bank of the stream a coal bed at the horizon of the Hamlin coal shows in natural exposure. The bed section is as follows:

Hamlin Coal

	Feet	*Inches*
Light-gray, sandy shale	3	
Block coal		22¼
Light-gray, clay shale floor		
Elevation	1048	

One hundred and fifty yards up the left fork of Gun creek, the Gun Creek coal has been opened by Elliott Marshall in a small right drain. This opening is completely caved. The elevation is 940.

The Whitesburg coal has been opened on a left branch of this drain by Elliott Marshal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Hard shale	3	
Block coal		9
Shale		2½
Block coal with some hard, dull coal		20½
Elevation	985	

These exposures give the interval between the Gun Creek and the Whitesburg coal as 45 feet on Burning fork; near its head this interval has increased to 55 to 60 feet.

Three hundred and twenty yards up the left fork of Gun creek the Whitesburg coal has been opened by Nick Marshal on the right of a right drain. The bed section here is:

Whitesburg Coal

	Feet	Inches
Massive sandstone		
Hard, black shale	3½	
Block coal		9½
Shale		3½
Block coal with much hard, dull coal		23½
Elevation	987	

The floor of this bed was not reached, but the coal is probably not more than 2 to 3 inches thicker at the most.

One hundred and fifty yards up a right branch which is 1,000 yards up the main left fork of Gun creek, the Whitesburg coal has been opened by Elliott Marshal on the left. The bed section is:

Whitesburg Coal

	Feet	Inches
Thin-bedded sandstone	2½	
Block coal		11½
Light-gray shale		3
Block coal		20½
Elevation	987	

The Whitesburg coal is again opened by Elliott Marshal on the right of this branch, one-fourth mile up. The bed section is:

Whitesburg Coal

	Feet	Inches
Thick-bedded massive sandstone with coal streaks cross-bedded in the base	5	
Dark-gray to black shale	1¾	
Block coal		10
Shale		1½ to 5
Block coal		19½
Elevation	984	

The parting in this bed varies greatly within a short distance and minor irregularities show in the roof of the bed:

The following section was obtained at the head of this branch:

Section

		Feet
Covered interval with a ledge-forming, massive sandstone in the upper two-thirds		80
Hazard coal bloom reported to have been faced up with a thickness of 2½ feet	Elevation	1260
Covered interval with a massive, ledge-forming sandstone in the lower portion		86
Covered interval		28
Prominent bench		
Covered interval		20
Coal float (Haddix)	Elevation	1126
Covered interval		126
Whitesburg coal	Elevation	1000

One hundred and fifty feet above the mouth of this branch, on the right bank of the fork, there is a 15-foot entry into the Gun Creek coal on Meredith Fletcher's land. The bed section is:

Gun Creek Coal

	Feet	Inches
Light-gray clay shale	8	
Block coal		3
Gray, hard, clay shale		7—8
Block coal		6¼
Shale—knife edge to		¼
Block coal		8½
Light-gray, soft clay shale		6½
Block coal		10½
Gray shale floor		
Elevation	942	

The bottom 10½-inch coal seam was said to be excellent shop coal. The upper seam of this bed has considerable pyrite. The roof is liable to cave unless very well timbered.

One thousand yards up the left fork of Gun creek and 400 yards up a small left branch on the left, Meredith Fletcher has a 25-foot entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	Inches
Massive sandstone	3½	
Black shale	1	
Block coal		10
Shale		3½
Block coal with much hard, dull coal		11½
Elevation	1018	

A left branch, 1,350 yards up the left fork of Gun creek, is named on the map Patrick branch. This is not the name which it bears locally, as the right fork of Gun creek is known as Patrick branch.

Three hundred and fifty yards up this branch, on the left, Lewis Marshal has a prospect into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Black shale		4
Block coal		10
Light-gray shale		3
Block coal		23½
Elevation	995	

This opening has an excellent roof and a good thickness of coal for this creek.

One-third mile up this branch the Whitesburg coal, opened by Haskell Marshal in a 40-foot entry, gives the following bed section:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	10	
Block coal		7½
Light-gray clay shale		3
Block coal		23½
Dark-gray shale floor		5+
Elevation	1004	

Five-eighths mile up this branch, on the left, on the land of Lon Risner, the following section was obtained:

Section

Hazard coal bloom	Massive sandstone	3½'	Ele. 1265
	Coal	18—20+"	
Covered interval			67
Bench			
Interval—contains a 20+ foot massive, ledge-forming sandstone			61
Bench; coal bloom (Haddix) reported just below			Ele. 1125
Covered interval			61
Bench			
Covered interval with massive sandstone at base			21
Fire Clay coal	Massive sandstone		Elevation 1055
	Flint fire clay	2 "	
	Block coal	9½"	

The Hazard coal of this section was prospected and was reported to be cannel coal. It is very possible, however, that a black slate or cannel slate was mistaken for bloom of cannel coal.

One-third mile up the left fork of Gun creek a bed of soft blue-gray shale shows in the bed of the stream, containing numerous small concretions. These concretions were frequently found to contain considerable sphalerite, a trace of galena and some banite; also a soft pulverulent, light yellow mineral of unknown composition. These calcareous shales are found throughout the Gun Creek region between the Whitesburg and the Gun Creek coals. There is a marked downstream dip at this point.

The Whitesburg coal has been opened by an entry, now completely caved, on the right of a small left branch 1 mile up the left fork of Gun creek. The elevation of this opening is 1000. Two feet of massive sandstone shows over the coal.

One and one-eighth miles up the fork and one-fourth mile up a left branch, on the right of the branch, Irving Fletcher has a 20-yard entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	2	
Black shale		6+
Block coal		9
Light-gray shale		½
Block coal		3
Hard, dull coal		2¼
Block coal		1
Hard, dull coal		1¼
Block coal		4¾
Hard, dull coal		2¼
Elevation	995	

One hundred feet upstream from this opening, on the same side of the branch, Irving Fletcher has a partly caved 15-foot opening into the Whitesburg coal. There are several adjacent openings here. The bed section and the elevation of this bed are the same as of the preceding opening.

One-third mile up this branch, on a left drain back of his house, Irving Fletcher has a completely caved opening into a coal bed reported to be 5 feet thick, with a 6-inch parting just below the middle of the coal. Such a thickness for a bed at this horizon is highly improbable. The elevation is 1055. This is the Fire Clay coal.

One and a quarter miles up the left fork is a right branch known as Blaze branch. Fifty yards up this branch, on the left, Riley Fletcher has an opening into the Whitesburg coal at elevation 1023, mostly caved. The coal was reported to be 25 inches thick.

Two hundred and fifty yards up this branch, on the left, Riley Fletcher has a completely caved opening into the Fire Clay Rider at elevation 1100. The bed was reported to be 26 inches thick, solid coal.

Fifty yards up the left fork of this branch, on the right, Riley Fletcher has a prospect into the Whitesburg coal. The bed section is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Hard, black shale	2	
Block coal		10
Shale		½
Block coal		10½
Elevation	1025	

One hundred yards up the left fork of this branch an 8-inch coal bed shows in natural exposure at stream level. The elevation of the bed is 1045. This is probably a low split of the Fire Clay coal.

One-fourth of a mile up this left fork, in a left drain, the Fire Clay Rider shows in natural exposure. The bed section is:

Fire Clay Rider

	Feet	*Inches*
Light-gray clay shale	12	
Block coal		6½
Shale		¼
Block coal		8
Bituminous shale		3½
Block coal		11½
Light-gray, sandy shale	6+	
Elevation	1103	

One and a half miles up the left fork of Gun creek, on the right, George Fletcher has a 25-foot entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone	3½	
Black shale	1	
Block coal		10
Shale		3½
Block coal with much hard, dull coal		11½
Elevation	1018	

One mile above the mouth of Gun creek is a small branch on the left, just below the mouth of Higgins branch.

Three-eighths mile up this branch, on a left fork, the following section was obtained on the left of the stream:

Section

		Feet
Massive sandstone, forming ledges		40
Covered interval		20
Bench		
Covered interval		10
Coal bloom reported	Elevation	1090
Covered interval		95
Fire Clay rider coal opening	Elevation	995
Covered interval		9
Fire Clay coal opening	Elevation	980
Sandy shales		50
Whitesburg coal (parted)	Elevation	930

In the opening by Willy Shepard, mentioned in the above section, the Fire Clay Rider gave the following bed section:

Fire Clay Rider

	Feet	Inches
Massive sandstone		
Splint coal		16½
Elevation	995	

At the same locality, 15 feet vertically below this bed, the Fire Clay coal has been opened:

Fire Clay Coal

	Feet	Inches
Massive sandstone	6	
Hard, light-gray shale	1	
Block coal		7½
Flint fire clay		2½—3½
Splint and block coal mixed		18
Elevation	980	

Two hundred and fifty yards further up the river the Gun Creek coal has been raised from the river bed by Mr. Shepard. A section here is as follows:

Gun Creek Coal

	Feet	Inches
Massive sandstone		
Block coal		36½
Elevation	874	

This included a parting less than 4 inches thick.

HIGGINS BRANCH

One and one-eighth mile above the mouth of Gun creek on the left. Elevation of mouth, 875.

One-fifth of a mile up Higgins branch, on the right, a coal bloom has been dug into at elevation 1022. This is at the horizon of the Fire Clay Rider coal, being 30± feet above the horizon of the Fire Clay bed at this point.

One-fourth of a mile up Higgins branch, on the left, the Whitesburg coal is opened by Noah Patrick in a 120-foot entry. The bed section is as follows:

Whitesburg Coal

	Feet	Inches
Thin-bedded sandstone		
Dark-gray to black shale	4	
Block coal		12
Light-gray shale		11
Block coal		13
Elevation	942	

A section at this point, on the left, is as follows:

Section

		Feet
Fossiliferous limestone	Elevation	1075
Covered interval		60
Fire Clay rider coal bloom	Elevation	1015
Covered interval		27
Fire Clay coal bloom	Elevation	990
Covered interval		52
Whitesburg coal opening given above	Elevation	943

Opposite the point where this section was made a heavy coal bloom showing cannel slate and a block of cannel 4 inches thick were found at elevation 1225. This is the bloom of the Hazard coal. Although this coal is only 10 to 20 feet below the coal called the Flag coal in the following section, the Fire Clay interval of 225 feet and the interval to the fossiliferous limestone of 140 feet are both too small for this coal to be the Flag coal. The Hazard coal is known to have cannel slate as an immediate roof in this vicinity.

One-half mile up Higgins branch, on the left, and 100 yards above the coal opening by Noah Patrick is a

20-yard entry into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Thin-bedded sandstone		
Dark-gray to black shale	4	
Block coal		12
Light-gray shale		11
Block coal		14
Elevation	952	

The same bed has been opened by Branch Higgins, 100 feet up the left fork of Higgins branch, on the left. The bed section here is as follows:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Black shale	3—4	
Block coal		14
Light-gray clay shale		8
Block coal		13
Elevation	962	

Three hundred yards up this left fork of Higgins branch, on the left, an opening is just being started by Branch Higgins into the Whitesburg coal. The bed section is:

Whitesburg Coal

	Feet	*Inches*
Massive sandstone		
Hard, black shale	3½	
Block coal		11¾
Light-gray shale		7½—8½
Block coal		13—14
Elevation	965	

Three hundred and fifty yards up this left fork of Higgins branch the following section was obtained:

Section

				Feet
Base of 15+ feet, cliff-forming, High Rock sandstone			Elevation	1295
Covered interval with shale float				45
Flag coal bloom			Elevation	1250
Covered interval with shaly sandstone float				128
Bench and slight coal bloom (Trace Fork coal)			Ele.	1122
Covered interval				9
Massive sandstone				20
Shaly sandstone and sandy shale				50
Light-gray to white massive sandstone				23
Fire Clay rider coal bloom—7 inches			Elevation	1020
Thick-bedded, light-gray shales				14
Fire Clay coal	Block coal	4½"	Elevation	1005
	Flint fire clay	1¼"		
	Block coal	19¼"		
Light-gray clay shales with ferruginous concretions				9½
Coal	Block coal	9½"	Elevation	995
	Shale	3¾"		
	Block coal	1¼"		
	Shale	1¾"		
	Block coal	¼"		
Covered interval				5
Massive sandstone				24
Whitesburg coal			Elevation	965

In this section the interval between the Fire Clay and Flag coals is exceptionally low—245 feet, the same interval on Puncheon creek being 260 to 270 feet.

The interval between the Flag coal and the fossiliferous limestone—140 feet—is the same as on Puncheon creek, and the interval of the Flag coal to the base of the High Rock sandstone is about the same.

Two hundred yards above the mouth of Higgins branch the following section was obtained from a little above the level of the road to river level:

Section

		Feet
Place of Whitesburg coal	Elevation	930
Covered interval		18
Light-gray sandy shales and thin-bedded shaly sandstones with large calcareous concretions in the lower portion of the interval		37
River level	Elevation	875
Place of Gun Creek coal	Elevation	870—873

One-fourth mile below the mouth of Little Half Mountain branch, on the left of the road and opposite a house on the right of the road, coals showed in natural exposure as follows:

Section

			Feet
Massive sandstone			
Fire Clay rider	Block coal 7 "	**Elevation**	**956**
	Hard, white quartzitic sandstone, somewhat bituminous ⅜"		
	Block coal 5½"		
Soft-gray shale with ferruginous concretions			12
Block coal (Fire Clay coal)—7½+ inches		Elevation	944
Light-gray shale, massive sandstone at the base			32
Coal—7½ inches		Elevation	912

The coal at elevation 944 has been prospected, but is now caved. Flint fire-clay float was found on the dump.

Sixty yards upstream the coal given in section at elevation 912 has risen to 918 to 920 feet with a thickness of 9 inches.

Two hundred yards below the mouth of Half Mountain creek is a small left-hand branch, known as Little Half Mountain branch.

One-half mile up this branch, on the right in a small right drain above the second house on the branch, the Haddix coal has been opened. The opening is now partly caved. A partial section is:

Haddix Coal

	Feet	*Inches*
Massive sandstone	1½	
Light-gray clay shale	3	
Block coal		¾
Dark shale with thin coal laminations		
Block coal with some hard, dull coal		16½+
Elevation	1012	

This bed was reported to have been thin and is probably not more than 2 feet thick.

Two hundred yards further up the branch the same bed is opened in a right drain. The opening is completely caved.

Opposite the mouth of Half Mountain creek, on the left of the Licking River road, Green Carpenter has a 20-yard entry into the Fire Clay coal with the following bed section:

Fire Clay Coal

	Feet	*Inches*
Massive sandstone	25	
Thin-bedded clay shale	6	
Block coal		9
Black bituminous slate		2½
Flint fire clay		5
Black bituminous slate		2
Block coal		5
Elevation	950	

A section here is as follows:

Section

	Feet
Massive ledge-forming sandstone	20
Covered interval	50
Massive sandstone	55
Haddix coal bloom . . . . . Elevation	995
Interval containing massive sandstone 25+ feet thick in the lower part	39
Shale	6
Fire Clay coal opening (bed section given above) . . . Ele.	950

One-third mile above the mouth of Half Mountain creek, on the left of the Licking River road, Joe Allen has a completely caved opening into the Fire Clay coal at elevation 943. No flint fire clay was seen on the dump.

Three-eighths mile below the mouth of Puncheon creek, on the left of the Licking River road, a coal bloom 5″+ thick shows on the left side of the road. This is the bloom of one of the thin split beds which come at the horizon of the Whitesburg coal.

The Hamlin coal has been opened by Joe Allen 200 yards up a small left branch, one-fourth mile below the mouth of Puncheon creek, at elevation 990. The opening is completely caved.

At the head of this branch, on the right, the Hamlin coal has again been opened at elevation 985. The bed is now completely caved.

PUNCHEON CREEK AND SALT LICK AND LONG BRANCHES OF LICKING RIVER

These streams drain an area of approximately 16 square miles. Puncheon creek, the largest of the three, forks 1 mile up, the left fork being known as the Jaker fork. Salt Lick and Long branches have no large tributaries.

The coals opened and exposed on these streams include all that are usually found between the Whitesburg and the Flag coals and in addition the Fugate coal, which is the highest coal opened in the county. Most of the openings, however, are in the highest and lowest of these coals. The Whitesburg is the lowest coal above drainage in this area, and this only on Puncheon creek. Streams of the Big Sandy drainage heading against the creeks, however, show the Gun Creek and Tom Cooper coals, the former showing 39½ inches of coal with a thin parting, but the latter only 20 inches with a thick parting. This gives a vertical thickness of strata of about 700 feet. A rather uniform dip to the south toward the axis of the Licking river syncline brings the Fire Clay coal below drainage at the mouth of Long branch.

The Fugate coal is opened in a number of places on Salt Lick branch and Puncheon creek, with a thickness varying from 42 to 55 inches of coal with only occasionally a thin 1 to 2 inch parting. It is high in the hills, however, and would have only a comparatively small area. This coal comes just above the High Rock sandstone and below the Puncheon Creek sandstone. These sandstones are both prominent on these creeks. The Puncheon Creek sandstone forms cliffs 60 to 70 feet high, when it is near the top of the ridge. Below it is a 40 to 50 foot covered interval, which is also believed to be massive sandstone, but finer-grained and without the cliff-forming character.

The High Rock sandstone forms vertical cliffs from 30 to 40 feet high, the Fugate coal coming immediately above it.

The Flag coal coming 75 to 85 feet below the Fugate coal, was not opened or exposed where a bed section could be made. Only two slight prospects into it were found.

Only two openings were found into the Hazard coal and these showed a thickness of 38½ inches of coal badly split by partings on Puncheon creek and 34 inches of solid coal at the head of Salt Lick branch. The Hazard comes on the lower edge of a wide bench 115 to 125 feet below the Fugate coal and 45 to 60 feet below the Flag coal. Further development of this bed may prove it to be a valuable one, as it would have a good area on Salt Lick and Long branches.

The Whittaker coal was opened only at the head of Salt Lick branch, where it showed 25 inches of coal with a parting. Sections on Puncheon creek indicate that this coal is missing on at least a part of that creek.

Exposures of the Young coal, or the low split seams of it, were only seen at the head of Salt Lick creek and on the river below the mouth of that creek. The upper seam of this bed is only 13 feet below the Whittaker coal, at the head of Salt Lick branch, and shows 11 inches of coal. Three other seams, one 17 inches thick, occurring in a shale or shaly sandstone interval of 45 feet, are splits of this coal. Several coal blooms near the horizon of this coal on Long branch and Salt Lick branch indicated it as split into a number of seams there also.

Near and just below the mouth of Salt Lick branch the Trace Fork coal is opened. This coal is only 10 to 12 feet above the Fossil limestone, with a massive sandstone 40 feet or 50 feet thick above it. It is not believed to be persistent over much area, as no evidence of a coal at this horizon was found at other points.

The Haddix coal is above drainage on Puncheon and Salt Lick branches and is represented by a thin coal just above drainage on Long branch. It was less than 30 inches in thickness of coal where exposed.

In the 60 to 70 feet between the Haddix and the Fire Clay coals are three coals. On the lower part of the main fork of Puncheon creek and on Salt Lick branch two of these coals are present, coming 20 and 40 feet above the Fire Clay coal, the intervals being massive sandstone. On the Jaker fork of Puncheon creek these coals are missing and the Hamlin coal, about half way between the Haddix and Fire Clay coals, is present. Whether the two coals on the lower part of the main creek and on Salt Lick branch are the splits of the Hamlin is not definitely known. The Hamlin is also present in the upper part of the main fork of Puncheon creek, where it is mined for local use.

The Fire Clay coal is present and above drainage on the Jaker fork of Puncheon creek, but if present would be just about stream level at the mouth of Salt Lick branch and below drainage on Long branch. The presence of this coal on the upper half of the main fork of Puncheon creek and the head of Salt Lick branch is doubtful. It thins from some 12 to 20 inches of coal near the mouth of Puncheon to only one or two inches of coal with the flint fire-clay parting at the point where it goes under drainage on Jaker fork and no coal with a flint fire-clay parting was observed on the main fork of Puncheon creek.

Between the Fire Clay coal and the Whitesburg coal are two thin coals less than 15 inches thick. These coals are found only in a small area about the fork of Puncheon creek and on Jaker fork. Where these coals are present the interval to the Whitesburg coal is shale or mostly so, but where missing the interval is shaly sandstone.

The Whitesburg coal, 40 to 50 feet below the Fire Clay coal on Puncheon creek, is only above drainage on the Jaker fork and a short distance up the main fork of Puncheon creek. Near the mouth of the creek this coal is split into two beds 10 feet apart, but toward the north these coals are found together, making up a 26 to 30 inch coal.

The Gun Creek coal 40 to 60 feet below the Whitesburg coal is below drainage on all three of the streams under discussion, but just over the ridge, on the Big Sandy drainage it shows 39½ inches of coal opposite the head of Puncheon and Salt Lick creeks. It is probable that this coal maintains an average thickness of 30 inches throughout the greater part, if not the whole of the area under consideration, and is only a short distance below drainage and therefore with no loss of area due to erosion.

The Tom Cooper coal, also everywhere below drainage on these streams, shows on the Big Sandy side in Floyd county only 20 inches of coal, with a 12-inch parting. The thickness and number of coals lower than the Cooper coal in this territory could only be determined by core drilling.

PUNCHEON CREEK

At the mouth of Puncheon creek, on the left, 15 feet above the road, is a split seam of the Whitesburg coal, showing 7 inches of coal beneath 3+ feet of sandstone.

In front of Milburn Conley's house, 100 yards up the creek, is a caved opening into the Fire Clay coal at elevation 970. Hodge (K. G. S., Series IV, Vol. I, part II, page 902) gives the following section for this coal:

Fire Clay Coal

	Feet	*Inches*
Coal stain		
Shale		11
Coal		
Shale and flint fire clay		6
Coal		8
Elevation	970	

Just above this point, up a small left branch, the following section shows the Haddix coal and bloom of the Fire Clay coal and its rider:

Section

			Feet	*Inches*
Sandstone			60	
Haddix Coal	Sandstone	5′	Elevation 1015	
	Gray shale	1′		
	Coal	7″		
	Shale	1″		
	Coal	14″		
	Shale	2″		

(Opened up left fork of this branch.)

		Feet
Medium-bedded to shaly sandstone		35
8-inch coal—Fire Clay rider	Elevation	980
Shale		20
Bloom of the Fire Clay coal	Elevation	960
Arenaceous shale		15
Covered		40
Mouth of branch		

Five-eighths of a mile up Puncheon creek, in the head of a right drain, the bloom of the Hazard coal was dug into on a wide bench, at elevation 1140.

Up the left fork of the second left branch, three-fourths miles up Puncheon creek, Bruce Howard has the Hamlin coal (?) opened on the right:

Hamlin Coal

	Feet	*Inches*
Shale	5	
Coal (three knife-edge partings of shale)		9
Coal		13+
Elevation	1025	

A section out of the branch below this opening shows:

Section

			Feet
Hamlin coal		Elevation	1025
Covered			45
Bloom of the Fire Clay coal		Elevation	980
Sandstone			40
Whitesburg coal	10-inch coal	Elevation	940
	Sandstone		3
	Shale		7
	14-inch coal	Elevation	930
Shale			3
Covered			20
Stream level at mouth			

This section shows the Whitesburg coal split into two beds and the black slate roof missing. This, however, is found over the upper of the two at the forks of Puncheon creek, where the following section was made:

Section

			Feet
Bench—flint fire clay in soil		Elevation	980
Sandstone			54
Black fissile shale			1
Whitesburg coal	10-inch coal	Elevation	935
	Shale		10
	12-inch coal	Elevation	925
Shale			18
Creek level			

JAKER FORK OF PUNCHEON CREEK

One mile up on the left. Elevation of mouth, 907.

One-fourth mile up Jaker fork, on the right, just above the school house, a split of the Whitesburg coal shows 18 inches of coal under a sandstone ledge, at elevation 925, where it has been dug out for local use. A section up the hill above this shows two coal blooms between this and the Fire Clay coal:

Section

		Feet
Flint fire clay found in soil	Elevation	985
Sandstone		25
Coal bloom	Elevation	960
Shaly sandstone		15
6-inch coal bloom	Elevation	945
Sandstone		20
18-inch coal—Whitesburg coal	Elevation	925

A caved opening into the Whitesburg coal, on the right at the mouth of Shunny branch, is at elevation 925.

One-half mile up Shunny branch, on the left, the Fire Clay Rider is opened and showed:

Fire Clay Rider

	Feet	Inches
Soil		
Gray shale		2½
Black shale		5
Fire clay		3
Coal		15
Shale floor		
Elevation	986	

On the left at the mouth of Shunny branch, the bloom of the Fire Clay coal is seen at elevation 965.

Three-fourths of a mile up Jaker fork and up a left branch one-eighth mile, the Whitesburg coal is in the bed of the branch at elevation 938. A section here shows:

Whitesburg Coal

	Feet	Inches
Sandstone	8	
Black slate	3	
Coal		12
Shale		4
Coal		3+

A section above this point shows the Fire Clay and a low split of the Haddix coal:

Section		Feet
Level of a good bench	Elevation	1065
Sandstone		7
Shale		7
Coal bloom	Elevation	1045
Gray shale		15
Coal bloom—Hamlin coal	Elevation	1030
Covered		22
Coal bloom and bench—Fire Clay rider	Elevation	1008
Covered		8
Massive sandstone		10
Shale		5
8-inch coal bloom—probably Fire Clay coal	Elevation	985
Covered		47
Whitesburg coal	Elevation	938

The coal bloom at 1045 is probably of the Haddix coal.

One and one-eighth miles up Jaker fork, on the left, Isaac Risner has several openings into the Whitesburg coal at elevation 935. Only one of them was in a condition to measure:

Whitesburg Coal	Feet	Inches
Gray arenaceous shale	4	
Black slate	1	
Coal		12
Gray shale		4½
Coal		18
Elevation	935	

Another opening one-fourth mile further up on the left, at the level of the road, shows the same section as fare as could be seen, the lower half being covered.

MEREDITH FORK OF JAKER FORK

One and one-half miles up on left.

At the mouth of Meredith fork the Whitesburg coal is at elevation 954. Up a left branch, one-fourth mile up Meredith fork, Estill Marshal has the Whitesburg coal opened at elevation 965:

Whitesburg Coal	Feet	Inches
Black slate	4	
Coal		14
Gray shale		8
Coal		19
Fire clay floor		
Elevation	968	

One hundred and fifty yards further up Meredith fork, on the right, another opening showed:

Whitesburg Coal

	Feet	Inches
Black slate	4	
Coal		11
Shale		8
Coal		8+
Elevation	905	

One-eighth mile further up, on the left, are three other openings into the Whitesburg coal, all of which were partly caved, and only the upper seam of coal could be seen, which was the same as in the above section. This coal goes under drainage just below the forks, five-eighths mile up, of Meredith fork. A section on the point at the forks shows:

Section

		Feet
Good bench	Elevation	1075
Covered with shaly sandstone drift		62
Massive sandstone		13
Arenaceous shale		10
7-inch coal	Elevation	990
Shale		7
9-inch coal	Elevation	983
Gray shale and shaly sandstone		20
Black slate in the bed of creek, roof of the Whitesburg coal	Elevation	963

The two coals are the same as those found near the mouth of Jaker fork, just above the school house. Up the fork of Meredith fork these coals go under drainage, and one-half mile up the Fire Clay coal, at elevation 1008, showing the following sections:

Fire Clay Coal

	Feet	Inches
Sandstone	8	
Shale	1½	
Black bituminous slate		2
Flint fire clay		4
Coal		12
Elevation	1008	

The two coals shown in the section at the forks go under drainage at about the same distance up the right fork of Meredith fork; also the Fire Clay coal at one-half mile up. Here there is only 2 or 3 inches of coal above and 4 or 5 inches below the flint parting, which is very dark and contains much bituminous matter, being flinty only in places. Its elevation here is 995.

One-fourth mile up the right fork of Meredith fork, on the left, at the head of a right drain, Nero Whittaker has the Fugate coal opened:

Fugate Coal

	Feet	Inches
Sandstone	5	
Coal		15
Shale		3
Coal		28
Shale floor		
Elevation	1346	

This opening is within 60 feet of the top of the ridge. Just over the ridge, in the head of the second left drain of the right fork of Meredith fork, this coal is opened again by Morgan Risner:

Fugate Coal

	Feet	Inches
Sandstone	8	
Coal		53
Shale floor		
Elevation	1350	

Seven-eighths of a mile up the right fork of Meredith fork, at the mouth of a right branch, the Hamlin coal shown in the following section is exposed:

Section

			Feet
6-inch coal		Elevation	1047
Shale			2
Hamlin coal	Coal 3″ Clay 4″ Coal 15″	Elevation	1045
Fire clay			1
Massive sandstone			5
6-inch coal		Elevation	1030
Shale			8
Stream level			

The Hamlin coal is opened three-eighths mile farther up the creek, one-eighth mile above the mouth of a right branch, by L. M. Salyers:

Hamlin Coal

	Feet	Inches
Shale	4	
Coal		18
Shale floor		
Elevation	1075	

In a left branch three-fourths of a mile up the right fork of Meredith fork, the Haddix coal is opened one-fourth mile up, on the right, on the place of Morgan Risner and shows:

Haddix Coal

	Feet	Inches
Shale	4	
Coal		8
Shale		4
Coal		7
Shale		15
Coal		5+
Elevation	1085	

One-half mile up Jaker fork above the mouth of Meredith fork, at the mouth of a right branch, three openings into the Whitesburg coal, on Peter Risner's place, show:

No. 1

Whitesburg Coal

	Feet	Inches
Black slate	4	
Coal		12
Shale		15
Coal		14
Shale floor		
Elevation	955	

No. 2

Whitesburg Coal

	Feet	Inches
Black slate	4	
Coal		12
Shale		15
Coal		14
Shale floor		
Elevation	955	

No. 3

Whitesburg Coal

	Feet	Inches
Black slate	4	
Coal		12
Shale		12
Coal		8+
Elevation	955	

On the right, just below the mouth of Sampoe branch of Jaker fork, the Whitesburg coal shows:

Whitesburg Coal

	Feet	Inches
Gray shale	2	
Black slate	4	
Coal		12
Shale		24
Coal		10+
Elevation	950	

Within 30 feet the shale parting in this coal increases from 2 feet to 5 feet in thickness. Above this bed the following section shows the Fire Clay coal represented only by its flint parting:

Section

	Feet
Massive sandstone	30
Grayish-black shale	3
3-inch flint fire clay........................Elevation	990
Shaly sandstone	30
Covered	4
Gray shale	2
Black slate	4
Whitesburg coal	

In the head of the left fork of Sampoe branch, Dial Risner has 10-yard entry into the Fugate coal, which shows:

Fugate Coal

	Feet	Inches
Sandstone	10	
Coal		50
Shale floor		
Elevation	1340	

Massive sandstone shows above this coal, more or less covered, for 100 feet, the upper part being that which forms the upper cliffs discussed at the beginning of the description of Puncheon creek. A generalized section for Sampoe branch shows:

Section

			Feet
Coal entry		Elevation	1340
Cliff-forming sandstone			30
Covered interval			70
Broad bench, reported coal bloom—Hazard coal		Ele.	1240
Covered interval			130
Massive sandstone			50
Haddix coal	Coal 6" Shale 5" Coal 12"	Elevation	1060
Covered			14
Coal bloom		Elevation	1046
Shale			6
Coal bloom, indicative of a 12 to 18 inch coal—Hamlin coal		Elevation	1040
Massive to shaly sandstone			47
Grayish-black shale			2
Fire Clay coal exposed 200 yards up the branch, showing	Coal 2" Flint fire clay 3" Black bituminous shale 5"	Elevation	990
Shaly sandstone			5
8-inch coal		Elevation	985
Shaly sandstone			15
Gray shale containing pyrite concretions			15
Black slate roof of the Whitesburg coal			4
Mouth of branch		Elevation	951

Up a little right drain one-eighth mile up Bob branch of Jaker fork Patrick T. Risner has the Hazard coal opened with bed section as follows:

Hazard Coal

	Feet	*Inches*
Massive sandstone	5	
Black bituminous shale (Cannel slate)		18
Shale		1½
Coal		12½
Shale		4½
Coal		7
Shale		12½
Coal		19
Black shale		1
Elevation	1200	

The black bituminous shale of this coal resembles cannel coal, but it does not burn to an ash.

A section above this opening shows:

Section

		Feet
Top of knob	Elevation	1460
Covered		50
Massive Puncheon Creek sandstone		40
Covered (the Fugate coal comes at the bottom of this covered interval)		50
Massive High Rock sandstone		40
Covered		45
Prospect into the Flag coal showing 12-15-inch coal bloom	Elevation	1255
Covered		55
Opening into Hazard coal	Elevation	1200

One-fourth mile up Bob branch the Hamlin coal shows the following section:

Hamlin Coal

	Feet	Inches
Shaly sandstone	5	
Coal		8
Hard, sandy shale parting		3
Coal		15
Arenaceous shale floor		
Elevation	1015	

At the head of Bob branch the Fugate coal, opened by Robert Risner, shows the following bed section:

Fugate Coal

	Feet	Inches
Sandstone	15	
Coal		17
Shale		1
Coal		27
Shale floor		
Elevation	1315	

One hundred yards above the mouth of Bob branch the following section shows the Fire Clay coal very poorly developed:

Fire Clay Coal

	Feet	Inches
Massive sandstone	15	
Shale	3	
Black bituminous shale		5
Flint fire clay		3
Shale		1
Sandstone	1	
Elevation	985	

One-fourth mile above the mouth of Coon Hollow branch the Hamlin coal shows, on the left, the following section:

Hamlin Coal

	Feet	*Inches*
Soil		
Coal		10
Shale		5
Coal		18
Shaly sandstone	24	
Elevation	1040	

At the head of Jaker fork the Fugate coal, opened by Jim Howard, shows the following section:

Fugate Coal

	Feet	*Inches*
Sandstone	10	
Coal		42+
Elevation	1320	

Water prevented seeing all of the coal.

In a little left drain back of a house one-fourth mile up Puncheon creek above Jaker fork the Hamlin coal shows the following section in a slight prospect:

Hamlin Coal

	Feet	*Inches*
Sandstone	10	
Gray shale	1	
Coal		4
Shale		1
Coal		15
Shale floor		
Elevation	1015	

Two thin coals 10 feet apart, each less than 10 inches, show at various places along the road from a point one-half mile up Puncheon creek above the mouth of the Jaker fork, where they are at elevation 970 and 980, to three-eighths mile above the mouth of Pigpen branch, where they go under drainage at elevation 940 and 950. These coals are at or near the horizon of the Fire Clay coal and either represent all that is left of it or are riders to it. No flint parting could be found.

Three-fourths of a mile above Jaker fork, where a large left drain comes down, the following section shows the Hamlin coal at the top and the upper of the two coals mentioned above:

Section

		Feet
18-inch coal bloom—Hamlin coal	Elevation	990
Arenaceous shale		35
8 inches of coal	Elevation	955
Gray shale		8

One and one-eighth miles above Jaker fork, in a right drain just below and opposite Lick branch, a 3-yard entry into the Fugate coal, by Levi Joseph, shows the following bed section:

Fugate Coal

	Feet	Inches
Sandstone	4	
Shale		2
Coal		4
Shale		½
Coal		12
Shale		1
Coal		32
Elevation	1240	

Immediately below this opening is 40 feet of sandstone, which stands out in a perpendicular cliff, and at elevation 1115 is the lower edge of the wide Hazard bench.

The following section on the right of the mouth of Lick branch shows the Hamlin coal:

Section

				Feet
Shale				6
Hamlin coal	Coal	6″	Elevation	960
	Shale	3″		
	Coal	18″		
Fire clay				2
Shale				4
Sandstone				2
Shale				9
Probably Fire Clay coal or its rider	6-inch coal		Ele.	943
	Shale			2
	7-inch coal		Ele.	941
Shale				8
Stream level				

The two thin coals at the bottom of the section above go under drainage a short distance up Pigpen branch and one-half mile up the Hamlin coal goes under at elevation 985, showing the following bed section:

Hamlin Coal

	Feet	*Inches*
Shale	20	
Coal		10
Sandy shale parting	2	
Coal		12
Shale floor		
Elevation	985	

Just below the top of the ridge, in the road over to salt Lick branch, just above Pigpen branch, the bloom of the Hazard coal is at elevation 1140.

The Hamlin coal is opened by John Joseph on the left, 1 mile above Pigpen branch, and shows the following bed section:

Hamlin Coal

	Feet	*Inches*
Shaly sandstone		
Coal		8
Sandstone	1	
Shale		8
Coal		1
Black bituminous shale		1
Coal		6
Shale		1
Coal		5
Sandy shale		2½
Coal ... Elevation	978	8
Shale		1
Sandstone to creek level	12	

Up a right drain opposite this opening the Fugate coal is opened at elevation 1230. Its bed section is as follows:

Fugate Coal

	Feet	*Inches*
Sandstone	8	
Coal		48+
Elevation	1240	

One hundred yards below the mouth of Linbark branch of Puncheon creek, on the right at elevation 1126, is a caved opening into the Hazard coal. This opening is reported to have shown six feet of coal.

Into the head of Linbark branch, on the left, Elsie Risner has the Fugate coal opened, showing the section given below:

Fugate Coal

	Feet	Inches
Sandstone	6	
Coal		23
Shale		½—1
Coal		24
Shale floor		
Elevation	1250	

Above this opening is 65 feet covered and then 60 feet of massive, coarse-grained, cliff-forming sandstone.

Just over the ridge from this opening, in a right drain, one-fourth mile below Gapville P. O., this coal is again opened:

Fugate Coal

	Feet	Inches
Sandstone	10	
Coal		18
Shale		1
Coal		24
Elevation	1260	

Another opening in the head of the next right drain coming in at Gapville P. O. shows:

Fugate Coal

	Feet	Inches
Sandstone	12	
Coal		18
Shale		1
Coal		28
Shale floor		
Elevation	1250	

Another opening back of Hondy Holbrook's house, one-eighth mile from the Floyd-Magoffin county line, shows:

Fugate Coal

	Feet	Inches
Sandstone	5	
Coal		22
Shale		½
Coal		35
Shale floor		
Elevation	1260	

The Hamlin coal goes under drainage just above the mouth of Linbark branch at elevation 985. Three-eighths mile below Gapville, at the mouth of a large left branch, what is evidently the Haddix coal has been taken from the bed of the branch at elevation 1046. One seam showed 14-inch coal. A section from this point to the gap at the head of the creek shows:

Section

		Feet
Top of ridge	Elevation	1206
Covered		50
Slipped coal bloom	Elevation	1156
Covered		30
Strong coal bloom on edge of a good bench—Haddix coal	Elevation	1126
Massive, bedded sandstone		50
7-inch coal	Elevation	1076
Shaly sandstone		10
12-inch coal bloom	Elevation	1066
Covered		20
14-inch + coal taken from bench—Haddix	Elevation	1046

A section down into the head of Rough and Tough branch of the right fork of Middle creek shows:

Section

			Feet
Top of hill		Elevation	1206
Covered			26
Hazard coal	Coal bloom	Elevation	1180
	Covered		15
	Coal bloom	Elevation	1165
Covered			20
Massive sandstone			65
Covered			90
Level of a reported coal 22 inches thick—Hamlin		Elevation	990
Covered			30
Slight coal bloom and black, bituminous shale—Fire clay coal horizon		Elevation	960
Massive sandstone			35
Coal bloom—Whitesburg (?)		Elevation	925
Covered			13
Massive sandstone			35
Covered			18
Foot of the hill			
Covered			22

Two hundred yards down the stream the Tom Cooper coal, opened on the left, shows the following section. Elevation, 802:

Tom Cooper Coal

	Feet	Inches
Sandstone	4	
Gray shale		8
Coal		8
Shale and coal		12
Coal		12
Shale floor		
Elevation	802	

Massive sandstone shows in the stream bed on down to the forks of Rough and Tough branch, 1 mile from the gap. On the right of the creek just below the forks W. W. Hopkins has the Gun Creek coal opened to show the following bed section:

Gun Creek Coal

	Feet	Inches
Dark-gray shale	6	
Dark, bituminous shale	1—2	
Coal		11½
Shale		4½
Coal		28½
Elevation	870	

On the point on Licking river just above the mouth of Puncheon creek the Flag coal was dug into at elevation 1255, now completely caved. Only blocks of black bituminous shale were seen on the dump. Thirty-six feet above this opening is the base of the High Rock, cliff-forming sandstone.

Just up the river from this opening in the next left drain the Fire Clay coal shows the following bed section where opened by John Elain:

Fire Clay Coal

	Feet	Inches
Gray shale	3+	
Coal		9
Black, bituminous shale		2½
Flint fire clay		5
Black, bituminous shale		2
Coal		5
Shale floor		
Elevation	950	

One mile up the river from the mouth of Puncheon creek, at the bend in the river above the mouth of Dutton creek, the following section shows the Hazard (?) coal and the blooms of several others:

Section

			Feet
Gray shale			10
Hazard (?) coal	Coal 12" Shale 14" Coal 8"+	Elevation	1138
Shale			10
Massive sandstone			43
Coal bloom—Young coal		Elevation	1085
Shaly sandstone, covered in places			100
Coal bloom		Elevation	985
Massive, bedded sandstone			23
Coal bloom—Hamlin coal (?)		Elevation	962
Massive, gray calcareous sandstone			31
14-inch coal bloom—Fire clay coal		Elevation	931

One-fourth of a mile below the mouth of Salt Lick branch the Trace Fork coal is opened on the left of the river by A. J. Brown:

Trace Fork Coal

	Feet	Inches
Massive sandstone	10	
Coal		11
Semi-cannel coal		15
Elevation	1030	

Ten feet below this bed blocks of the hard, blue, fossiliferous limestone were found:

SALT LICK BRANCH

One and three-fourths miles above Puncheon creek, on the left. Elevation of mouth, 908.

Up the first left branch, one-fourth mile up Salt Lick branch, the Trace Fork coal is opened just over the hill from the opening on the river. Its bed section here as given by Hodge (K. G. S., Series IV., Vol. I, Part II) is as follows:

Trace Fork Coal

	Feet	*Inches*
Sandstone	10	
Shale	5	
Soft coal		11
Cannel coal		7
Splint coal		10
Elevation	1030	

At the mouth of this first left branch the following section shows the two thin coals above the Fire Clay coal as seen in the section given on a preceding page:

Section

		Feet
Trace coal	Elevation	1030
Covered		30
Sandstone		35
Coal bloom	Elevation	965
Massive sandstone		10
Sandstone		10
Coal bloom	Elevation	945
Massive sandstone		25
Creek level	Elevation	920

The two coals at elevation 965 and 945 remain above drainage as far as Lick branch of Salt Lick branch.

In the head of Lick branch is a caved entry into the Fugate coal, just below the ridge at elevation 1220. The coal was reported 48 inches thick. A section down this branch shows:

Section

	Feet
Caved opening into the Fugate coal .... Elevation	1220
Coarse-grained, cliff-forming sandstone	30
Covered interval	70
Level of wide, broad bench—Hazard coal ..... Elevation	1100–1120
Covered	45
Caved prospect into what is probably the Young coal Elevation	1055
Massive sandstone	75
Shaly sandstone	10
4-inch coal .... Elevation	970
Covered to the mouth of the branch	

On the right of right drain, just above the mouth of Alum Rock branch, a wet, partially caved entry into the Fugate coal, on Bart Allen's place, shows the following section:

Fugate Coal

	Feet	Inches
Massive sandstone	10	
Shale		9
Coal		8
Shale		2
Block coal		17½
Coal reported		16
Elevation	1230	

One mile above Alum Rock branch, up a left drain, another 12-yard entry into the Fugate coal shows the following bed section:

Fugate Coal

	Feet	Inches
Shale	3	
Coal		20
Shale		½
Block coal		25
Shale floor		
Elevation	1236	

Three-eighths mile up the left fork of Salt Lick branch, at the point where it forks, a coal 18 inches thick in the bed of the branch, at elevation 1060, is a low split of the Young coal. Ten feet above this is another thin 7-inch coal. On the opposite side of the branch from the gap into Rough and Tough branch a 15-yard entry into the Fugate coal shows:

Fugate Coal

	Feet	Inches
Sandstone roof	5	
Coal		20
Shale		1
Coal		24½
Shale floor		
Elevation	1255	

Just over the ridge, a little to the north of west from this opening, another opening into this coal shows the same section as the preceding one. Elevation, 1250.

Up the right fork of Salt Lick branch several thin coals, all splits of the Young coal, are exposed; also the Whittaker coal and the Hazard coal, all of which are seen in the following generalized section:

Section

	Feet
Hazard coal, opened by Alec Stone one-half mile up the fork . . . Elevation	1140
Bed section shows:	

Hazard Coal

	Feet	Inches
Massive sandstone	6	
Cannel slate (black, bituminous shale)		8
Coal		34
Shale floor		
Elevation	1140	
Massive sandstone	22	
Whittaker coal, opened 200 yards down stream from the opening into the Hazard coal	1113	

Whittaker Coal

	Feet	Inches
Massive sandstone		
Coal		7
Shale		12
Coal		17
Shale floor		
Elevation	1113	
Massive sandstone	13	
11-inch coal—upper split of Young coal . . . . Elev.	1100	
Covered	20	
6—8-inch coal . . . . Elevation	1080	
Shale and shaly sandstone	25	
17-inch coal exposed on the right, 100 yards up the fork—low split of Young coal . . . Elevation	1055	
Sandstone	31	
Forks of branch . . . . Elevation	1024	

LONG BRANCH

Three-fourths mile above Salt Lick branch.

Although the high coals are low in the hills on Long branch, no openings into any coal was found. This is probably due to the fact that there are no side branches of any size where the coals have been exposed. The High Rock sandstone coming above the Flag coal and also the Puncheon Creek sandstone above the Fugate coal are prominent features on this creek.

On the left, at the mouth, a 12-inch coal is exposed, which is the upper of two thin coals coming 30 and 50 feet above the Fire Clay coal along the river near the mouth of Salt Lick branch.

A section up the hill along the road over the ridge to Licking river, just below the mouth of Whitley creek, is as follows:

Section

			Feet
Top of ridge		Elevation	1193
High Rock sandstone			18
Covered			15
Bloom of Hazard coal		Elevation	1120
Covered			45
Splits of Young coal	Coal bloom	Elevation	1075
	Covered		15
	Coal bloom	Elevation	1060
Covered			120
Foot of hill			

One and three-fourths miles up Long branch blocks of the blue, fossiliferous limestone were seen at elevation 980.

A section from the top of the hill down the trail coming over from Salt Lick branch, 1 mile from the head of the branch, gives:

Section

		Feet	*Inches*
Covered		33	
Place of Fugate coal .... Elevation		1265	
Coarse-grained, cliff-forming sandstone		40	
Covered		80	
Bloom of Hazard coal and good bench .. Elevation		1140	
Covered		50	
Sandstone		4	
Young coal	10-inch coal .... Elevation	1086	
	Shale	3	
	Coal		8
	Shaly sandstone	11	
	24-inch coal .... Elevation	1072	
Foot of hill			

Practically a continuous exposure of massive sandstone is had in the bed of the creek down to elevation 980.

The coals representing the Young coal are seen at different points near the stream bed until they go below drainage one-half mile from the head of the creek.

One-fourth of a mile below the mouth of Whitley branch what is probably the coal exposed on the left at the mouth of Long branch is just above river level at elevation 920 A. T.

A section down the hill along the road from Long branch shows:

Section

		Feet
Crest of the ridge .... Elevation		1193
Coarse-grained sandstone which forms cliffs		18
Thin coal bloom—Flag coal rider .... Elevation		1175
Covered		20
Bloom of the Flag coal .... Elevation		1155
Covered		35
Coal bloom—Rider to Hazard coal (?) .... Elevation		1120
Covered		45
Coal bloom—Whittaker coal .... Elevation		1075
Covered		25
Upper and lower splits of Young coal	Coal bloom .... Elevation	1050
	Covered	30
	Coal bloom .... Elevation	1020
Covered		10
Massive sandstone		70
Covered		20
River level .... Elevation		920

The main bed of the Hazard coal probably comes in the 45-foot covered interval. Other thin seams of the Young coal are probably present in the 30-foot covered interval between the upper and lower seams.

WHITLEY CREEK, HOWARD BRANCH, MOLLY BRANCH, BIG BRANCH, BRUSHEY FORK, WILL BRANCH AND GRASSY CREEK

The streams are all tributary to Licking river on the left above Long branch. They drain an area of approximately 14 square miles, which constitutes a large part of the most promising coal field in the county. It lies on what may be called a plateau, the level of the streams draining it being on the average 300 feet higher than those flowing into the Levisa fork of the Big Sandy river.

The strata of this area rise in a southern direction, at the rate of about 30 feet to the mile, from Howard branch and Whitley creek, which streams lie in about the center of the Licking River syncline. The lowest strata above drainage are those lying 10 feet below the Fire Clay coal and the highest those which lie 200 feet above the Flag coal. Although strata only 10 feet below the Fire Clay coal are above drainage in this area, sections down into the Big Sandy drainage show some 350 feet of lower measures. The strata above the Fugate coal are mostly massive sandstones. The only evidence of a coal within this interval was a thin coal bloom on the high point, on the left, at the head of Howard branch.

The Fugate coal, so well developed on Puncheon creek and Salt Lick branch, comes in the covered interval between two cliff-forming sandstones (Puncheon Creek and High Rock), the lower of which does not form cliffs in this area, however. One opening into the Fugate coal showed 42 inches of coal with 19 inches of partings. This coal is high in the hills throughout the area. It comes 30 to 40 feet below the base of the Puncheon Creek sandstone.

The Flag coal was found opened in two places. One was only a slight prospect and a full section could not be made; the other showed 28 inches of solid coal.

No openings into the Hazard coal were found. An exposure of the bed at the head of Howard branch showed 18″+ of coal.

WHITTAKER COAL. This coal is a thick coal only toward the head of Licking river, from Howard branch up. There is evidence in favor of its being really the Young coal, but it is called the Whittaker coal because it seems too close to the Hazard and Flag coals on Grassy creek and on to the head of the river, occupying there a stratigraphic position which would be too high for the Young and lower than the Hazard, coming 30 feet below the latter coal on Howard branch and on Grassy creek.

The Whittaker coal is probably the best coal above drainage in the upper Licking river region, averaging 48 inches of coal, or better, over the whole area under discussion. On Whitley creek it is only 25 inches thick, but increases to 40 inches on Howard branch and reaches a thickness of 109 inches of coal with only 8½ inches of partings on Grassy creek. Above Grassy creek this coal, although having the same thickness of coal, is injured by partings. It is on an average about 150 feet above the level of the river and therefore would have a good area.

No openings were found into the Young coal. Several thin coals lying below the Whittaker coal on Whitley creek, probably represent this coal there, but the thickness and value of the coal elsewhere in this area must be determined by prospecting. It should be found 15 to 30 feet below the Whittaker coal.

Averaging about 25 feet below the Fossil limestone is the Haddix coal. This coal is below drainage on Whitley and Howard branches, coming above drainage at the mouth of Molly branch, where it shows 18 inches of coal. It is about the same thickness where the bloom shows in the road down into Lick creek, which heads against Howard branch. On Will branch, however, this bed has a thickness of 36 inches of coal with 4 inches of parting. It is about 55 feet above drainage at the mouth of Grassy creek, but gets lower further up the river, where the rate of rise of the stream is greater than that of the coal.

Between the Haddix and Fire Clay coals are two thin coals, which, however, are not persistent. The one coming 20 feet above the Fire Clay coal, separated from it by shale, corresponds with what has been called the Fire Clay Rider elsewhere. These coals are of no commercial value.

The Fire Clay coal is equally, or more promising, in this region than the Young coal. It rises above drainage just below the mouth of Grassy creek, where it shows 31 inches of coal in the lower bench, and remains just above or at drainage level up to the mouth of Straight fork. In the road down into the head of Lick fork from the head of Howard branch it shows about 3½ feet of coal bloom, and on the Big Sandy waters at the head of Grassy creek it has 43 inches of coal with only 2 to 3 inches of flint parting. It is probable that this coal averages 36 inches of coal throughout the area from Howard branch to the head of the river and is only a few feet below drainage over a large part of the area and hence unhurt by erosion.

The Whitesburg coal is 40 to 45 feet below the Fire Clay coal. No bed section could be had as it is nearly everywhere below drainage. Its bloom was seen in two places, one up the hill at the head of Lick fork, heading against Howard branch, and the other at the head of Salyers branch of Salt Lick branch of Beaver creek.

The remaining coals which should be found below drainage in this area are the Gun Creek, Tom Cooper and other coals. The Tom Cooper, coming 185 feet below the Fire Clay coal, was seen on the Lick fork of the left fork of Middle creek, just over the ridge from the head of Howard branch, and there showed 48 inches of solid coal.

A coal which shows 40 to 45 inches solid coal on Beaver creek at Bosco and other places on that creek, about 3½ miles from the head of Grassy creek, where it is mined extensively by the Elkhorn Coal Corporation, should be about 300 feet below drainage along Licking river at the mouth of Grassy creek. To determine more definitely, however, as to the nature of these coals it will be necessary to make core drill tests.

WHITLEY CREEK

Up a left branch, one-fourth mile up Whitley creek, two coals, the Whittaker and a split of the Young coal, are exposed; the upper one opened by John Wireman:

Whittaker Coal

	Feet	Inches
Massive sandstone	6	
Gray shale		5
Impure, shelly coal		3
Coal		21
Shale floor		
Elevation	1047	

Twenty-seven feet below this opening the Young coal shows 14-inch coal in the bed of the branch. Massive sandstone shows in the branch to its mouth.

One mile up Whitley creek the Fossil limestone, consisting of 1 foot of blue, hard, impure, fossiliferous limestone, is in the bed of the creek at elevation 960 A. T. This rises with the stream to a point at elevation 980, where it goes below drainage.

One and three-eighths miles up the creek, in front of Smith Allen's house, the Whittaker coal and two thin coals, probably splits of the Young coal, are seen:

Whittaker Coal

	Feet	Inches
Shaly sandstone	10	
Impure, shelly coal		1½
25-inch coal ....Elevation	1050	
Coal and shale		3
Covered	15	
Coal		8
Shale	12	
Sandstone	3	
Coal		6
Shaly sandstone	15	
Stream level		

The bed at elevation 1050 is the same as that in the left drain farther down the creek at 1047. Also the massive sandstone in that branch is seen to have changed and the Fossil limestone and several thin seams of the Young coal come in.

One hundred yards up the left fork of Whitley creek the Whittaker coal is opened and shows:

Whittaker Coal

	Feet	*Inches*
Shaly sandstone	10	
Impure coal		1½
Coal		12
Shale		1
Coal		14
Shale and coal		3
Elevation	1080	

Another opening 200 yards up the right fork shows:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	10	
Gray shale		2
Coal		12
Shale and coal		6
Coal		4½
Shale		1
Coal		10
Elevation	1075	

One hundred yards farther up a 10-inch bed of coal under 20 to 30 feet of massive sandstone is 18 feet above this coal opening.

HOWARD BRANCH

One-eighth mile up the Whittaker coal shows by natural exposure the following section:

Whittaker Coal

	Feet	Inches
Massive sandstone	10	
Soft, blue shale		18
Coal		30+
Drift—probably more coal		
Elevation	1042	

A thin coal 4 inches thick, near the bed of the creek at elevation 965 at the mouth of Bear branch of Howard branch, is a thin coal coming 10 feet above the Haddix coal.

One mile up Bear branch, on the left, 15 feet above the branch at elevation 1065, a caved entry into the Whittaker coal was found. It was reported 3½ feet thick, with a 5-inch shale parting.

One-half mile above Bear branch Harris Arnett has a 6-yard wet entry into the Whittley coal on the left:

Whittaker Coal

	Feet	Inches
Sandstone	4	
Soft, gray shale		10
Coal		16
Shale		2
Coal		19+
Water		
Elevation	1050	

Below this opening in the bed of the stream is the Fossil limestone, consisting of 1 foot of hard, blue fossiliferous limestone with 2 feet of blue shale below and 6 inches of impure gray fossiliferous limestone, at elevation 980.

Three-eighths mile from the gap at the head of Howard branch the Whittaker coal, where prospected into by Doc Howard in a small left branch, shows:

Whittaker Coal

	Feet	Inches
Sandstone	3	
Soft, gray shale	2½	
Coal		20
Shale		5
Coal		17
Shale floor		
Elevation	1080	

One hundred and fifty yards up the creek from this prospect another opening on the right shows:

Whittaker Coal

	Feet	Inches
Sandstone	2	
Gray shale		6
Coal		22½
Shale and coal		5
Coal		18
Elevation	1085	

A section from the top of the knob on the left at the head of Howard branch down into the head of Lick fork of the left fork of Middle creek shows:

Section

		Feet
Top of hill	Elevation	1562
Covered		90
Massive sandstone		35
Covered		5
Massive sandstone		35
Covered		27
Coal bloom—Hindman (?)	Elevation	1370
Covered		98
Massive, cliff-forming sandstone		50
Thick-bedded sandstone		9
Shaly sandstone		23
Coal bloom—Flag coal rider	Elevation	1190
Shale		15
Bloom of Flag coal	Elevation	1175
Massive sandstone		60
Bloom of Hazard coal	Elevation	1115
Arenaceous shale		5
Covered		40
Coal stain	Elevation	1070
Covered		20
Massive sandstone		71
Covered, blue shale drift (level of the Fossil limestone about 975)		25
Shaly sandstone		12
Slight coal bloom	Elevation	942
Shaly sandstone		8
Haddix coal	Elevation	934

Section

	Feet	Inches
Section from bloom shows:		
Coal		12
Shale		2
Coal		2
Shale		4
Coal		7
Shale	2	
Shaly sandstone	8	
7-inch coal bloom ... Elevation	924	
Shale	4	
12-inch coal bloom ... Elevation	920	
Massive sandstone	25	
Shaly sandstone	5	
Bloom of the Fire clay coal. Indicates a bed 3—4 feet thick ... Elevation	885	
Shaly sandstone	17	
6-inch coal bloom ... Elevation	868	
Shaly sandstone	10	
Covered	4	
Shaly sandstone	12	
Black slate	2	
Bloom of the Whitesburg coal ... Elevation	840	
Covered	4	
Massive sandstone	50	
Covered. The place of the Gun Creek coal is near the top of this interval	36	
Coal bloom ... Elevation	739	
Heavy-bedded sandstone	35	
Foot of the hill ... Elevation	704	
Section continued down the creek shows:		
Shaly, gray, calcareous sandstone	14	
Level of opening into the Tom Cooper coal on the left of Lick branch three-eighths mile above the mouth of Rough and Tough branch.. Elevation	690	

Tom Cooper Coal

	Feet	Inches
Shaly sandstone	8	
Coal		46—48
Shale floor		
Elevation	690	

This coal is opened again one-fourth mile up Rough and Tough branch. Its section here shows:

Tom Cooper Coal

	Feet	Inches
Shaly sandstone	6	
Coal		48
Elevation	700	

MOLLY BRANCH

In the bed of the stream at the mouth of Molly branch the Haddix coal shows in the following section:

Haddix Coal

	Feet	Inches
Sandstone	2	
Shale		6
Coal		3
Shale		1½
Coal		3
Shale		2
Coal		4+
Elevation	950	

Three-fourths mile up Molly branch and one-eighth mile up a left drain the Whittaker coal is opened by Kelly Howard:

Whittaker Coal

	Feet	Inches
Massive sandstone	8	
Coal		22
Shale and coal		4
Coal		18
Elevation	1080	

In the bed of the drain below this opening the Fossil limestone is at elevation 1010.

One mile up Molly branch, in the head of a left branch, the Whittaker coal, opened by Kelly Howard, shows:

Whittaker Coal

	Feet	Inches
Massive sandstone	15	
Shale		3
Coal		16
Shale		1
Coal		24
Shale		1
Coal		3
Shale		
Elevation	1085	

At the head of Molly branch, on the left opposite the last house, the Whittaker coal is opened:

Whittaker Coal

	Feet	Inches
Sandstone	1	
Shale		10
Coal		17
Shale		2¼
Coal		24
Shale		3
Coal		5½
Shale floor		
Elevation	1085	

The base of the Puncheon Creek sandstone is 160 feet above this opening.

One-fourth mile below the mouth of Big branch an opening into the Whittaker coal shows:

Whittaker Coal

	Feet	Inches
Shale and drift	6	
Coal		6
Fire clay shale		30
Coal		48
Shale		
Elevation	1090	

One-eighth mile up the river above the mouth of Molly branch the Haddix coal has been dug from beneath a sandstone ledge. Its bed section is:

Haddix Coal

	Feet	Inches
Sandstone		
Coal		7
Shale		4
Coal		18
Elevation	955	

Just below the mouth of Big branch the Haddix coal at river level shows the following section as given by Hodge (K. G. S., Series IV, Vol. I, Part II):

Haddix Coal

	Feet	Inches
Sandstone	15	
Shale	3—6	
Coal		6—8
Shale	1½—4½	
Coal with two thin partings		30
Elevation	960	

BIG BRANCH

On the right, at the mouth of Big branch an opening into the Whittaker coal on Mrs. Sally Shepherd's place shows:

Whittaker Coal

	Feet	*Inches*
Shale	2	
Coal		10
Fire clay shale	4	
Coal		48
Shale floor		
Elevation	1095	

One-half mile up Big branch, on the right, another opening into the Whittaker coal shows:

Whittaker Coal

	Feet	*Inches*
Gray, arenaceous shale	10+	
Coal		11
Gray, fire clay shale		58
Coal		55
Shale floor		
Elevation	1090	

Another opening at the head of Big branch, on the left, belonging to Abe Johnson, shows:

Whittaker Coal

	Feet	*Inches*
Shaly sandstone	5	
Coal		10
Shale		1
Coal		12
Shale		1
Coal		1
Shale		1
Coal		42
Elevation	1090	

Twenty feet below this opening a thin coal shows in the bed of the branch.

BRUSHY FORK

On the right at the mouth of Brushy fork the Haddix coal shows under a sandstone ledge, where an excavation was made to build a house:

Haddix Coal

	Feet	Inches
Sandstone	15	
Coal		8
Shale		20
Coal		1½
Shale		1
Coal		2
Shale		½
Coal		2½
Black slate		3
Shale		3½
18-inch coal ..... Elevation	990	
Gray sandstone	5	
Covered	20	
River level		

One-half mile up Brushy fork, up a small left branch, the Whittaker coal is opened in two places, one on each side of the branch. The one on the right shows:

Whittaker Coal

	Feet	Inches
Sandstone	4	
Splint coal		5½
Shale		1½
Coal		53
Shale floor		
Elevation	1100	

The one on the left shows:

Whittaker Coal

	Feet	Inches
Arenaceous shale	4	
Coal		2½
Shale		1
Coal		2½
Fire clay shale		8
Coal		54
Fire clay		8
Shale floor		
Elevation	1100	

On the point just above the mouth of the little branch in which the above-described openings are a 2-foot coal bloom at elevation 990 is that of the Haddix coal. In the next left branch the Whittaker coal, where faced up, shows the following section:

Whittaker Coal

	Feet	*Inches*
Shale	5	
Shelly coal		9
Shale		½
Coal		55
Elevation	1100	

The lower 15 inches of this coal was under water and the measurement may not be accurate.

One-eighth mile up the large left branch, 1 mile up Brushy fork, the Haddix coal, dug from beneath a massive sandstone for a distance of 200 feet, shows:

Haddix Coal

	Feet	*Inches*
Massive sandstone		8
Arenaceous shale	2	
Blue shale		6
Coal		7
Shale		4
Coal		9
Shale		1
Coal		14
Sandstone floor		
Elevation	990	

Up the left fork of this branch one-fourth mile the Whittaker coal is opened on the left:

Whittaker Coal

	Feet	*Inches*
Massive sandstone	3	
Splint coal		24
Fire clay shale		15
Coal		44½
Black slate floor		
Elevation	1090	

Up the right fork of this branch one-half mile, on the right of the trail to Floyd county, another opening shows the Whittaker coal:

Whittaker Coal

	Feet	*Inches*
Drift		
Coal		24
Shale	6	
Coal		22
Shale		½
Coal		28
Elevation	1090	

Just below the mouth of Sulphur Springs branch of Brushy fork the Haddix coal goes under drainage at elevation 1020.

Three-eighths mile up Lick Log branch of Brushy fork, in a left drain, the Whittaker coal showed where faced up:

Whittaker Coal

	Feet	Inches
Sandstone	3	
Coal		32
Shale		½
Coal		4
Shale		8
Coal		19
Shale floor		
Elevation	1128	

Two thin coals in the bed of the branch at the mouth of Sycamore branch of Brushy fork are only 3 or 4 feet above the Haddix coal, which comes above drainage again at the forks of Brushy fork, three-eighths of a mile above Sycamore branch, and shows the following section 4 feet above the stream:

Haddix Coal

	Feet	Inches
Massive sandstone		
Shale	2	
Coal		3
Shale		21
Coal		8
Shale		3
Coal		8
Shale		
Elevation	1030	

On the fork point the Whittaker coal has been prospected, but was caved when visited. Its elevation was 1140 A. T.

The Haddix coal is seen a few feet above the stream up each fork for a distance of three-eighths mile, rising almost as fast as the streams. Up the right fork the following section shows the Fossil limestone and the Haddix coal:

Section

				Feet
One foot blue, hard, fossiliferous limestone			Elevation	1075
Covered				15
Haddix coal	Sandstone	5′	Elevation	1060
	Shale	2′		
	Coal	3″		
	Shale	18″		
	Coal	6″		
	Shale	2″		
	Coal	8″		
Covered				10
Stream level				

One-half mile above the mouth of Brushy fork Harry Shepherd has the Whittaker coal opened on the left. Its bed section is:

Whittaker Coal

	Feet	Inches
Sandstone		
Shale	1	
Coal		64
Shale floor		
Elevation	1120	

Another entry, partly caved, on the other side of the drain, shows:

Whittaker Coal

	Feet	Inches
Sandstone	10	
Shale		10
Coal		54+
Elevation	1120	

Three-eighths mile above Brushy fork, on the left of the river, the Haddix coal is opened by John Wireman on the left of the road. Its bed section is as follows:

Haddix Coal

	Feet	Inches
Massive sandstone	20	
Soft, gray shale	3	
Coal		8
Shale		6
Coal		8
Bone coal and slate		1
Shale		2—3
Coal		10+
Elevation	995	

Three-fourths mile above Brushy fork, on the right of the mouth of a left branch, John Wireman has the Whittaker coal opened. The bed section is:

Whittaker Coal

	Feet	Inches
Sandstone		
Gray, soft shale	3	
Coal		68
Shale floor		
Elevation	1135	

Just around the point on the river is another opening, belonging to R. B. Hale; the bed section as follows:

Whittaker Coal

	Feet	Inches
Shaly sandstone	4	
Coal		10
Shale	3	
Sandstone	1	
Shale	3	
Coal		63
Black, hard, shale floor		
Elevation	1140	

Three hundred yards up Will branch the Fire Clay Rider in the bed of the branch, at elevation 1030, shows:

Fire Clay Rider

	Feet	Inches
Coal		6
Shale	2	
Coal		12+
Elevation	1020	

Three-eighths mile up Will branch, on the right, J. B. Shepherd has opened the Whittaker coal, the bed section being:

Whittaker Coal

	Feet	Inches
Sandstone	2	
Shale	3	
Coal		22
Shale		½
Coal		27
Shale		½
Coal		21+
Elevation	1170	

One-fourth mile farther up the branch, on the right, the Fugate coal was faced up. Its bed section is as follows:

Fugate Coal

	Feet	Inches
Arenaceous shale	4	
Coal		5
Shale		1¼
Coal		10
Shale		4—4½
Coal		11
Shale and coal		2
Fire clay shale		10
Coal and shale		2
Block coal		17
Fire clay		
Elevation	1310	

In the head of Will branch, on the left, the Whittaker coal is opened. Its bed section is as follows:

Whittaker Coal

	Feet	Inches
Massive sandstone	5	
Coal		30½
Shale		1
Coal		4
Shale		10
Coal		11½
Elevation	1160	

One-half mile up Will branch, on the left, the Haddix coal shows by natural exposure:

Haddix Coal

	Feet	Inches
Shaly sandstone	4	
Coal		18
Shaly sandstone	4	
Coal		24
Shaly sandstone	10	
Elevation	1050	

One-fourth mile below the mouth of Grassy creek the Fire Clay coal is just above the river level and shows the following bed section where faced up:

Fire Clay Coal	Feet	Inches
Shaly sandstone drift		
Coal		13½
Fire clay		2
Coal		13½
Shale		12
Coal		2
Shale		6
Coal		2
Soft, gray, fire-clay shale		37
Coal		17
Flint fire clay		3
Coal		14
Shale floor		
Elevation	984	

This coal shows at several points up to the mouth of Grassy creek and rises steadily above drainage on to the head of the river.

On the right of the river, one-fourth mile below the mouth of Grassy creek, up a small branch, the Whittaker coal is opened on T. B. Whittaker's place and shows the following bed section:

Whittaker Coal	Feet	Inches
Massive sandstone	8	
Coal		13½
Fire-clay shale		52
Coal		56
Shale floor		
Elevation	1170	

In a little left drain just below the mouth of Grassy creek the Whittaker coal shows the following bed section at an opening belonging to T. B. Whittaker:

Whittaker Coal	Feet	Inches
Sandstone	3	
Shale	1	
Coal		14
Fire-clay shale	2½	
Coal		46
Shale		2
Coal		4
Shale		1½
Coal		11
Shale		4
Coal		12
Elevation	1175	

GRASSY CREEK

The Fire Clay coal is at stream level at the mouth of Grassey creek and shows the following section:

Fire Clay Coal

	Feet	Inches
Shale		
Coal		19
Shale	5	
Coal		8
Shale	5	
Coal		12
Flint fire clay		3
Coal		18
Elevation	986	

This coal rises with the stream for one-fourth of a mile to where it goes under drainage. Three thin coals, the upper 8 inches, middle 10 inches and lower 4 to 6 inches thick, about 5 feet apart, the lower one 15 to 20 feet above the Fire Clay coal, all representing the Fire Clay Rider (?), are seen at different points along the stream until they go under drainage 1½ miles up.

Three-eighths mile up Grassy creek, up a left drain back of his house, J. M. Whittaker has the Whittaker coal opened. Its bed section is:

Whittaker Coal

	Feet	Inches
Massive sandstone	5	
Shale	5½	
Coal		13½
Arenaceous shale	6	
Gray shale		12
Coal		26
Shale		3
Coal		6
Fire clay		1
Coal		19¾
Shale		1½
Coal		4½
Shale		1¾
Coal		14
Fire clay		1
Coal		38
Shale floor		12+
Elevation	1170	

Seventy feet above this opening a slight prospect into what is probably the Flag coal shows:

Flag Coal

	Feet	Inches
Soil	4	
Coal		13
Shale		6
Coal		4+
Water and mud		
Elevation	1240	

The opening into the Fugate coal, describeed previously, is 70 feet above this coal and just over the ridge.

Below this opening, at elevation 1055, the Fossil limestone was seen. A coal was reported to occur just below this. It is the Haddix coal.

Up a large left branch, three-fourths mile up Grassy creek, the upper two of the thin coals at the horizon of the Fire Clay Rider are seen at elevation 1020 and 1025. Three-eighths mile up this branch the Haddix coal or a split of it shows by natural exposure:

Haddix Coal

	Feet	Inches
Sandstone	2	
Shale	2	
Coal		4
Shale		1
Coal		7
Shale		3
Coal		9
Shale	1	
Elevation	1060	

One mile up Grassy creek, on the left, Albert Whittaker has a partly caved opening into the Whittaker coal. Its bed section is as follows:

Whittaker Coal

	Feet	Inches
Soil	3	
Coal		18
Shale		16
Coal		3
Shale		3
Coal		21
Shale		13
Coal		2
Shale		14
Coal		12+
Elevation	1190	

At the forks of Grassy creek, one-half mile from the gap, a split of the Haddix coal has been taken from the creek at elevation 1070:

Split of the Haddix Coal

	Feet	*Inches*
Massive sandstone	30	
Coal		2
Shale	4	
Coal		12
Elevation	1070	

On the right, at the gap at the head of Grassy creek, just inside of Floyd county, is an opening into the Flag coal. Its bed section is:

Flag Coal

	Feet	*Inches*
Massive sandstone	8	
Coal		28
Shale floor		
Elevation	1297	

A section from the top of the high knob on the left of the gap (Brush Creek Flag) down into the head of Salyers branch of Salt Lick creek shows:

Section

		Feet
Top of hill	Elevation	1500
Massive sandstone		52
Covered		8
Massive Puncheon Creek sandstone		63
Covered. Coal float in the soil—Fugate coal		36
Massive High Rock sandstone		44
Level of opening into Flag coal	Elevation	1297
Covered		160
Massive sandstone		15
Covered		100
Bloom of the Fire Clay coal	Elevation	1015
Massive sandstone		20
Covered		40
Coal bloom—Whitesburg coal (?)	Elevation	955
Massive sandstone		23
Covered		72
10-inch coal bloom	Elevation	860
Gray shale—calcareous concretions		50

On the right at the foot of the hill, in the head of Salyers branch, the Fire Clay coal is opened and shows the following section:

Fire Clay Coal

	Feet	Inches
Shaly sandstone	5	
Coal		23
Flint fire clay		2
Coal		20
Elevation	1014	

Two other openings into the Fire Clay coal, one one-fourth mile down the branch and the other one-half mile down the branch and up a right drain, show the following respective sections:

Fire Clay Coal

	Feet	Inches
Shaly sandstone	5	
Coal		22—24
Flint fire clay		2½
Coal		22
Shale floor		
Elevation	1017	

Fire Clay Coal

	Feet	Inches
Soil		
Coal		(?)
Sandstone	4	
Coal		23
Flint fire clay		3½
Coal		20½
Shale floor		
Elevation	1020	

Just below the mouth of Salyers branch, on the right of Salt Lick branch, the coal mined by the Elkhorn Coal Corporation at Bosco and Garrett, Ky., is opened. Its bed section shows:

	Feet	Inches
Massive sandstone	6	
Coal		17½
Shale		2
Coal		24
Elevation	722	

An opening on the left of the railroad, just above Bosco, shows:

	Feet	Inches
Massive sandstone	8	
Coal		46
Fire clay	1	
Elevation	730	

STRUCTURE

A structural contour map accompanies this report. On this the contours are drawn on the Fire Clay coal and represent the position of that coal with reference to sea level. The map also shows the position of the principal anticline and the two main faults in the county and the locations of wells already drilled.

Owing to minor unconformities in the lower formations and also the thickening of the Pottsville to the southeastward the smaller changes in structure shown by the contours as the Fire Clay coal may not, and probably will not, be reliable as a guide to structure in the deeper rocks. It is likely though that the more pronounced structure, as shown, for instance, on the Caney anticline and in other places in the county, will be approximately correct for the deeper sands as well.

The southeastward thickening of the Pottsville measures below the Fire Clay coal as plainly shown by the increasing intervals from that coal down to the top of the Mississippi. In the Morgan County oil fields this interval is 696 feet. In Magoffin county, in the well at Hendricks P. O., it is 854 feet, and on Beaver creek in Floyd county about 1,450 feet, showing an increase of the Pottsville of 754 feet in a distance of 30 miles.

On a portion of the structure map where contours are shown in dotted lines only a few bench marks were available and levels were necessarily worked out to a larger extent by barometric observations than in the portion to the east where numerous bench marks had been established. For this reason the structure lines shown as dotted lines are not as reliable as those shown as full lines.

MINERAL DEPOSITS

Sphalerite, galena and barite are found in small quantities in small concretions which occur in the interval between the Whitesburg and Gun Creek coals on the left fork of Gun creek. These of course, while of scientific interest, are of no economic importance. Blocks of mica are persistently reported as having been found in several places, but beyond the occurrence of the mica in micaceous sandstones, careful search failed to reveal it. The usual reports in regard to silver, lead and other minerals are prevalent, but with the above exceptions none will be found.

BUILDING STONE

The only stone in the county suitable for building purposes is sandstone. Sandstones are found in abundance in all parts of the county, but in most cases cannot be used for building stone. They vary in color from light-gray to grayish-white and brownish-white, and nearly all contain some mica and feldspathic material. In texture they vary from fine-grained to coarse-grained, and the latter are sometimes quite friable. A stone of unusual importance as a building stone for the county is a light-gray sandstone that is quarried 2 miles south of Salyersville, where stone for several buildings in Salyersville was obtained.

The stratigraphic horizon of the stone is that of the Gun Creek coal, which it has here cut out. A similar stone was also observed above the Haddix coal at the mouth of Big branch of Licking river.

The sandstone is massive and altogether free from bedding planes. It breaks easily in any direction and may be trimmed into blocks of any shape. It is light-gray in color, medium fine-grained, well cemented by a light-colored, feldspathic material, is slightly muscovitic and contains mica and specks of black bituminous matter.

At the quarry near Salyersville it occurs in a massive bed about 30 feet in thickness. The extent of the bed, however, is uncertain, because of the changeable nature of the rocks of this region. At the quarry the bed contains large, spherical, somewhat calcareous concretions as much as 6 feet in diameter.

Six buildings in Salyersville—two churches, a bank building, a stone building and two residences—have been constructed with this stone. It has the appearance of a gray limestone, and although not thoroughly tested is probably very durable.

In the case of one of the churches mentioned, where the stone had been exposed longest to weathering, the surface of the building blocks had taken on a light, rusty brown or yellowish brown color, due undoubtedly to the oxidation of the ferrous iron compounds in the unweathered stone.

ANALYSES OF COALS

No. 1-A

MAGOFFIN COUNTY

Laboratory number	G.-3787
Owner	Smith Adams
Location	near Falcon P. O.
Coal	Whitesburg—upper bench
Date of analysis	1917
Specific gravity of coal	1.337

SECTION OF OPENING

	Feet	Inches
Roof—Black Shale	3	0
Immediate Roof		
1. Soft block coal	......	8
2. Coal with interlaminated hard, dull coal	......	26
3. Coal with much hard, dull coal	......	29
Total	5	3
Excluded from sample, No. 3.		

ANALYSIS

Air-dry Loss, 1.35		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.25	......	......
	Volatile matter	35.64	37.22	41.06
	Fixed carbon	51.15	53.42	58.94
	Ash	8.96	9.36	......
		100.00	100.00	100.00
	Sulphur	1.50	1.92	1.72
Calorific Value Determined	B. T. U.	13020	13597	15000

No. 1-B

MAGOFFIN COUNTY

Laboratory number	G-3788
Owner	Smith Adams
Location	near Falcon P. O.
Coal	Whitesburg—lower bench
Date of analysis	1917
Specific gravity of coal	1.284

SECTION OF OPENING

	Feet	Inches
Roof—Black Shale	3	0
Immediate Roof		
1. Soft block coal	......	8
2. Coal with interlaminated hard, dull coal	......	26
3. Coal with much hard, dull coal	......	29
Total	5	3
Excluded from samples, Nos. 1 and 2.		

ANALYSIS

Air-dry Loss, 2.48		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	5.76	......	......
	Volatile matter	36.35	38.56	40.63
	Fixed carbon	53.11	56.36	59.37
	Ash	4.78	5.08	......
		100.00	100.00	100.00
	Sulphur	0.86	0.92	1.07
Calorific Value Determined	B. T. U.	13550	14380	15140

No. 2

MAGOFFIN COUNTY

Laboratory number G-3789
Owner .... Jane Estep
Location .... Lacey Creek
Coal .... Lacey Creek
Date of analysis 1917
Specific gravity of coal 1.274

SECTION OF OPENING

	Feet	Inches
Roof—Shale	4	0
Immediate Roof		
1. Splint coal	......	30 to 32
Total	......	30 to 32
Excluded from samples, none.		

ANALYSIS

Air-dry Loss, 1.45		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.30	......	......
	Volatile matter	36.62	38.27	40.49
	Fixed carbon	53.84	56.26	59.51
	Ash	5.24	5.47	......
		5.24	5.47	......
		100.00	100.00	100.00
	Sulphur	1.22	1.28	1.35
Calorific Value Determined	B. T. U.	13680	14260	15120

No. 3

MAGOFFIN COUNTY

Laboratory number	G-3790
Owner	Ben Montgomery
Location	Right fork of Rockhouse creek
Coal	Haddix
Date of analysis	1917
Specific gravity of coal	1.324

SECTION OF MINE

	Feet	Inches
Roof—Sandstone	5	0
Immediate Roof		
1. Soft, bright block coal	......	42 to 48
Total	......	42 to 48
Excluded from sample, none.		

ANALYSIS

Air-dry Loss, 1.70		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.50	......	......
	Volatile matter	38.83	40.67	44.77
	Fixed carbon	47.93	50.16	55.23
	Ash	8.74	9.17	......
		100.00	100.00	100.00
	Sulphur	2.78	2.91	3.21
Calorific Value Determined	B. T. U.	13530	14160	15590

No. 4

MAGOFFIN COUNTY

Laboratory number G-3791
Location .... White Oak creek, 1 mile above county line
Coal .... Fire Clay
Date of analysis 1917
Specific gravity of coal 1.303

SECTION OF MINE

	Feet	Inches
Roof—Gray Shale	10	0
Immediate Roof		
1. Coal	......	25
2. Flint fire clay	......	3
3. Coal	......	2½
Total	......	30½
Excluded from samples, Nos. 2 and 3.		

ANALYSIS

Air-dry Loss, 0.86		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	3.27	......	......
	Volatile matter	40.22	41.58	45.45
	Fixed carbon	48.57	49.90	54.55
	Ash	8.24	8.52	......
		100.00	100.00	100.00
	Sulphur	2.86	2.95	3.23
Calorific Value Determined	B. T. U.	14260	14740	16100

No. 5

MAGOFFIN COUNTY

Laboratory number	G-3792
Owner	Mart Conley
Location	White Oak creek, one-half mile above Lykins P. O.
Coal	Hazard
Date of analysis	1917
Specific gravity of coal	1.269

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone	5	0
Immediate Roof—Gray Shale	......	12 to 36
1. Cannel coal (variable thickness)	......	30
Total	......	30
Excluded from sample, lower 6 inches of coal.		

ANALYSIS

Air-dry Loss, 0.31		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	1.81	......	......
	Volatile matter	47.81	48.69	57.03
	Fixed carbon	36.03	36.69	42.97
	Ash	14.35	14.62	......
		100.00	100.00	100.00
	Sulphur	3.19	3.25	3.81
Calorific Value Determined	B. T. U.	13960	14220	16650

No. 6

MAGOFFIN COUNTY

Laboratory number	G-3793
Owner	Wm. Patrick
Location	At county line on State-road fork of Johnson creek
Coal	Young
Date of analysis	1917
Specific gravity of coal	1.314

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone	5	0
Immediate Roof		
1. Block and splint coal	......	36
Total	......	36
Excluded from sample, thin seam of slaty coal in upper part of bed.		

ANALYSIS

Air-dry Loss, 2.03		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.31	......	......
	Volatile matter	36.41	38.05	42.20
	Fixed carbon	49.86	52.09	57.80
	Ash	9.42	9.86	......
		100.00	100.00	100.00
	Sulphur	2.94	2.97	3.30
Calorific Value Determined	B. T. U.	13451	14055	15590

No. 7

MAGOFFIN COUNTY

Laboratory number	G-3794
Location	First Left branch of Grape creek
Coal	Haddix
Date of analysis	1917
Specific gravity of coal	1.258

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone	4	0
Immediate Roof		
1. Coal	......	30
Total	......	30
Excluded from sample, none.		

ANALYSIS

Air-dry Loss, 1.70		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.70	......	......
	Volatile matter	38.53	40.42	43.04
	Fixed carbon	51.01	53.52	56.96
	Ash	5.76	6.06	......
		100.00	100.00	100.00
	Sulphur	1.26	1.32	1.41
Calorific Value Determined	B. T. U.	13910	14590	15520

No. 8

MAGOFFIN COUNTY

Laboratory number	G-3795
Owner	T. J. Rice
Location	Burning fork, opposite Kelly branch
Coal	Whitesburg
Date of analysis	1917
Specific gravity of coal	1.319

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone	2	0
Immediate Roof—Hard, Dark Shales	......	18
1. Laminated coal	......	6
2. Block coal	......	9
3. Laminated coal	......	4
4. Splint coal	......	6
5. Laminated coal	......	5
Total	4	6

Excluded from sample, none.

ANALYSIS

Air-dry Loss, 1.55		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.63	......	......
	Volatile matter	34.72	36.40	39.24
	Fixed carbon	53.75	56.37	60.76
	Ash	6.90	7.23	......
		100.00	100.00	100.00
	Sulphur	2.18	2.28	2.46
Calorific Value Determined	B. T. U.	13590	14250	15360

No. 9

MAGOFFIN COUNTY

Laboratory number	G-3796
Owner	Larkin Arnett
Location	Left fork of Middle fork, 1½ miles above Hendricks, P. O.
Coal	Gun Creek
Date of analysis	1917
Specific gravity of coal	1.324

SECTION OF MINE

	Feet	Inches
Roof—Shale	15	0
Immediate Roof		
1. Coal	......	6
2. Shale	......	5½
3. Coal	......	2
4. Shale	......	6
5. Coal	......	11
6. Shale	......	10
Total	3	6½
Excluded from samples, Nos. 2, 4 and 6.		

ANALYSIS

Air-dry Loss, 2.39		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	5.01	......	......
	Volatile matter	35.35	37.20	41.90
	Fixed carbon	49.02	51.60	58.10
	Ash	10.62	11.20	......
		100.00	100.00	100.00
	Sulphur	3.08	3.24	3.65
Calorific Value Determined	B. T. U.	12720	13390	15070

No. 10

MAGOFFIN COUNTY

Laboratory number	G-3797
Owner	Joe Watson
Location	Head of Oakley creek
Coal	Hazard
Date of analysis	1917
Specific gravity of coal	1.341

SECTION OF MINE

	Feet	Inches
Roof—Arenaceous Shale	8	0
Immediate Roof		
1. Bituminous cannel slate	......	3
2. Coal	......	31
3. Shale	......	11
4. Coal	......	8
Total	4	5

Excluded from sample, Nos. 3 and 4.

ANALYSIS

Air-dry Loss		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	6.68	......	......
	Volatile matter	28.86	30.94	33.92
	Fixed carbon	56.25	60.27	66.08
	Ash	8.21	8.79	......
		100.00	100.00	100.00
	Sulphur	0.79	0.85	0.93
Calorific Value Determined	B. T. U.	12840	13760	15080

No. 11

MAGOFFIN COUNTY

Laboratory number G-3798
Location .... Head of Puncheon creek at Gapville P. O.
Coal .... Fugate
Date of analysis 1917
Specific gravity of coal 1.294

SECTION OF MINE

	Feet	Inches
Roof—Massive sandstone	10	0
Immediate Roof		
1. Coal	......	46
Total .... Excluded from sample, none.	......	46

ANALYSIS

Air-dry Loss, 4.13		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	6.16	......	......
	Volatile matter	23.17	24.69	26.73
	Fixed carbon	63.51	67.68	73.27
	Ash	7.16	7.63	......
		100.00	100.00	100.00
	Sulphur	0.85	0.90	0.98
Calorific Value Determined	B. T. U.	13410	14290	15470

No. 12

MAGOFFIN COUNTY

Laboratory number	[illegible]
Owner	[illegible]
Location	on Bull[illegible] [illegible]
Date of analysis	[illegible]
Specific gravity of coal	[illegible]

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone		
Immediate Roof		
1. Coal		2½
2. Mixed dull and bright coal with ⅛" shale parting		9½
3. Shale and coal mixed		12
4. Soft, bright block coal		8½
5. Shale and coal mixed		3
6. Soft, bright block coal		4½
7. Coal		5½
8. Hard splint coal		19½
Total	5	5

Excluded from sample, Nos. 3 and 5.

ANALYSIS

Air-dry Loss, 1.29		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	3.60		
	Volatile matter	34.34	35.63	39.89
	Fixed carbon	51.78	53.70	60.11
	Ash	10.28	10.67	
		100.00	100.00	100.00
	Sulphur	1.43	1.49	1.68
Calorific Value Determined	B. T. U.	12720	13190	14770

No. 13

MAGOFFIN COUNTY

Laboratory number	G-3800
Owner	Dan Wireman
Location	on Bull creek above Lick fork
Coal	Whittaker
Date of analysis	1917
Specific gravity of coal	1.300

SECTION OF MINE

	Feet	Inches
Roof—Gray Shale	4	6
Immediate Roof		
1. Coal with 2 to 3 inch shale parting	......	65
Total	......	65
Excluded from sample, shale parting.		

ANALYSIS

Air-dry Loss, 2.38		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	5.00	......	......
	Volatile matter	31.68	33.35	36.65
	Fixed carbon	54.74	57.62	63.35
	Ash	8.58	9.03	......
		100.00	100.00	100.00
	Sulphur	0.83	0.87	0.96
Calorific Value Determined	B. T. U.	13040	13710	15080

No. 14

MAGOFFIN COUNTY

Laboratory number	G-3801
Location	near head of Lick fork of Middle creek
Coal	Tom Cooper
Date of analysis	1917
Specific gravity of coal	1.277

SECTION OF MINE

	Feet	Inches
Roof—Shaly Sandstone	3	0
Immediate Roof		
1. Soft, bright block coal	......	46
Total	......	46
Excluded from sample, none.		

ANALYSIS

Air-dry Loss, 3.14		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	5.70	......	......
	Volatile matter	28.22	29.93	31.22
	Fixed carbon	62.19	65.95	68.78
	Ash	3.89	4.12	......
		100.00	100.00	100.00
	Sulphur	0.75	0.79	0.83
Calorific Value Determined	B. T. U.	13690	14520	15150

No. 15-A

MAGOFFIN COUNTY

Laboratory number	G-3802
Location	Raccoon branch of Salt Lick creek
Coal	Fire Clay—above flint-clay parting
Date of analysis	1917
Specific gravity of coal	1.324

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone		
Immediate Roof		
1. Soft block coal with 8—9 inches of hard splint coal	......	19
2. Flint fire clay	......	3
3. Coal with hard, dull interlaminated coal	......	21
Total	3	7
Excluded from sample, Nos. 2 and 3.		

ANALYSIS

Air-dry Loss, 1.23		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	3.42	......	......
	Volatile matter	33.79	34.98	38.06
	Fixed carbon	54.99	56.95	61.94
	Ash	7.80	8.07	......
		100.00	100.00	100.00
	Sulphur	1.61	1.67	1.81
Calorific Value Determined	B. T. U.	13640	14130	15370

No. 15-B

MAGOFFIN COUNTY

Laboratory number G-3803
Location .... Raccoon branch of Salt Lick creek
Coal .... Fire Clay—below flint-clay parting
Date of analysis 1917
Specific gravity of coal 1.305

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone		
Immediate Roof		
1. Soft block coal with 8—9 inches of hard splint coal	......	19
2. Flint fire clay	......	3
3. Coal with hard, dull interlaminated coal........	......	21
Total	3	7
Excluded from sample, Nos. 1 and 2.		

ANALYSIS

Air-dry Loss, 0.96		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.40	......	....
	Volatile matter	34.54	36.16	39.58
	Fixed carbon	52.72	55.13	60.42
	Ash	8.34	8.71	......
		100.00	100.00	100.00
	Sulphur	1.28	1.34	1.46
Calorific Value Determined	B. T. U.	12930	13520	14810

No. 16

MAGOFFIN COUNTY

Laboratory number G-3804
Owner .... Noel Wireman
Location .... on Big Run branch of Trace fork
Coal .... Whittaker
Date of analysis 1917
Specific gravity of coal 1.337

SECTION OF MINE

	Feet	Inches
Roof—Shaly Sandstone	4	0
Immediate Roof		
1. Block coal	......	32
Total .... Excluded from sample, none.	......	32

ANALYSIS

Air-dry Loss, 1.25		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	3.46	......	......
	Volatile matter	31.20	32.32	35.93
	Fixed carbon	55.65	57.64	64.07
	Ash	9.69	10.04	......
		100.00	100.00	100.00
	Sulphur	0.77	0.80	0.89
Calorific Value Determined	B. T. U.	13190	13662	15180

No. 17

MAGOFFIN COUNTY

Laboratory number	G-3805
Owner	Lenville Rowe
Location	Minnicks fork of Left fork of Trace fork
Coal	Flag
Date of analysis	1917
Specific gravity of coal	1.314

SECTION OF MINE

	Feet	Inches
Roof—Sandstone	1	6
Immediate Roof		
1. Splint coal	......	25
2. Block coal	......	9
3. Shale	......	7
4. Block coal	......	17
Total	4	10
Excluded from sample, No. 3.		

ANALYSIS

Air-dry Loss, 3.46		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	7.00	......	......
	Volatile matter	31.10	33.47	37.98
	Fixed carbon	50.90	54.68	62.02
	Ash	11.00	11.85	......
		100.00	100.00	100.00
	Sulphur	0.85	1.06	1.20
Calorific Value Determined	B. T. U.	12160	13060	14810

No. 18

MAGOFFIN COUNTY

Laboratory number	G-3806
Owner	R. C. Salyer
Location	on Salyer's branch
Coal	Fire Clay
Date of analysis	1917
Specific gravity of coal	1.361

SECTION OF MINE

	Feet	Inches
Roof—Massive Sandstone		
Immediate Roof		
1. Block coal	......	1½
2. Shale	......	⅛
3. Block coal	......	8½
4. Flint fire clay and bone coal	......	5
5. Block coal	......	24
Total	3	3⅛
Excluded from sample, No. 4.		

ANALYSIS

Air-dry Loss, 1.63		Coal as Received	Coal Moisture Free	Coal Moisture and Ash Free
Proximate Analysis	Moisture	4.07	......	......
	Volatile matter	33.10	34.50	41.23
	Fixed carbon	47.18	49.18	58.77
	Ash	15.65	16.32	......
		100.00	100.00	100.00
	Sulphur	2.63	2.74	3.27
Calorific Value Determined	B. T .U.	12210	12730	15210

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